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In This Issue

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BUTTERFLIES AT BAIT

8 August 1952

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THE LEPIDOPTERISTS' NEWS

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THE STRUCTURE OF THE LARVAL PROLEGS OF THE LEPIDOPTERA AND THEIR VALUE IN THE CLASSIFICATION OF THE MAJOR GROUPS

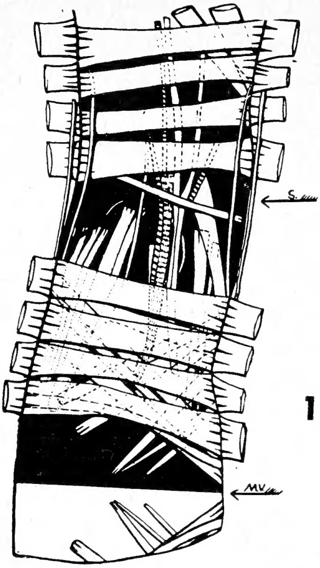
by H. E. HINTON

In 1946 I proposed a new subordinal classification of the Lepidoptera. This classification differed from that of Börner (1939) in two important particulars: (1) the Micropterygidae were placed in a separate order, the Zeugloptera, as first suggested by Chapman (1917), and (2) the suborder Dacnonypha was erected to contain the Eriocraniidae and related families with a decticous pupa (Hinton, 1946a). Each year since then a number of classifications of the Lepidoptera have appeared. Most of these, it must be admitted, are new arrangements produced by reshuffling already known facts. The classification of Kiriakoff (1948), however, deserves especial attention, as he has discovered a number of new facts about the structures of the tympanum. In the not too distant future I hope to reply in detail to the various critics of my classification, particularly as regards the position of the Micropterygidae. In the space now at my disposal I can do no more than reply rather briefly to those who believe that I paid insufficient attention to the structure of the larval prolegs. For instance, Kiriakoff (1948, p. 133) says of the structure of the larval prolegs, "Börner 1939 has rejected it as of no phylogenetic value; nor is it mentioned in Hinton's provisional scheme."

The great majority of the Lepidoptera are placed by Kiriakoff in two groups, the Stemmatoncopoda and the Harmoncopoda. To the first group belong all these species that have a complete or nearly complete circle of crochets on the ventral prolegs and to the second those that have a single longitudinal row of crochets. Thus Kiriakoff's division of the majority of the Lepidoptera does not differ from the older classifications of Karsch, Heymons, and others.

It is interesting to note that in the recent classification by Bourgogne (1951) no importance is attached to the structure of the prolegs, although Bourgogne still accepts Tillyard's two suborders, the Homoneura and the Heteroneura, a division of the Lepidoptera considered to be unnatural by both Börner (1939) and myself (1946).

If it be admitted that the primary aim of classification be to show, so far as is possible, the natural or genetic relations of the groups within the order, it follows as a necessary corollary that each group shall be monophyletic in terms of any other. If, therefore, it can be shown that the prolegs of the harmonocopodous type have been independently evolved by two or more families, the basis for the retention of the Stemmatocopoda and Harmonocopoda will have been destroyed, since it will be then apparent that the Harmonocopoda merely include those families in which the structure of the larval prolegs happens to



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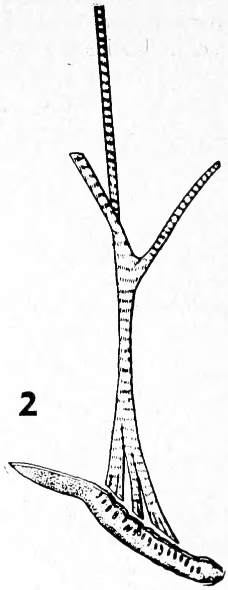

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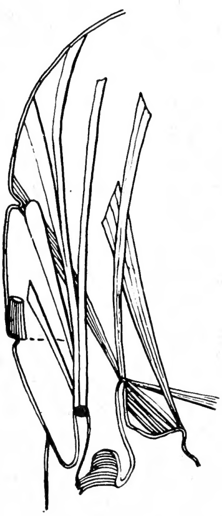

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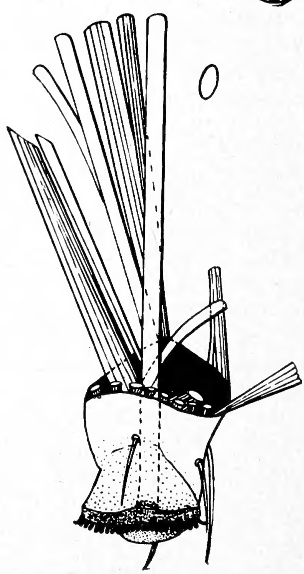

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Figs. 1-2 *Adela* sp. (1) Right side of fourth abdominal segment of full grown larva. (2) Posterior view of left proleg of sixth segment. (mv) Level of mid-ventral line. (s) Level of spiracle. The slender diagonal muscle shown is the occlusor of the spiracle.

Figs. 3-4 *Polia nebulosa* Hufn. (3) Cross section through the fifth abdominal segment to show proleg, which is considerably retracted. (4) Inner side of left proleg of fifth abdominal segment as seen when protracted.

converge, and, moreover, will contain families more related to some of those included in the Stemmatocopoda than to others included in the Harmonocopoda. For instance, in Kiriakoff's system the Hesperiidae are placed in the Stemmatocopoda but the remaining families of the Papilionoidea are included in the Harmonocopoda.

The morphology of the larval prolegs has received very little attention from a comparative point of view, although the external form of a considerable range of species is described by Goossens (1887). Schultze (1920) has described in some detail the variations in the number and form of the crochets of several species. The many other studies that have been made are restricted to single genera or families; and apart from isolated accounts of single species and a few very general studies, such as that of Snodgrass (1935), nothing is known of their internal structure.

The ventral prolegs (3-6) are hollow cylindrical outgrowths of the body wall. In most Microlepidoptera (Monotrysia and Ditrysia), and in the early instars of all and the final instar of some Papilionoidea, they have a complete or nearly complete apical circle of strongly sclerotised curved hooks known as crochets. The apical area bounded by and bearing the crochets is membranous and much less rigid than the sides of the prolegs. It is known as the planta. The retractor muscles are inserted in the planta, usually in its centre. They consist of a variable number of separate groups of fibres. In most of the families that were examined, they consist of two distinct sets, one arising well below and the other above the spiracle, as in the Cossidae. In the Hepialidae (*Hepialus*) and Yponomeutidae (*Yponomeuta*), however, all of the planta retractors arise above the level of the spiracle.

Contraction of the retractor muscles pulls the centre of the planta inwards, and the whole of the planta may be more or less completely invaginated within the proleg. The crochets on the periphery of the planta have their apices directed outwards and upwards. They are attached to the cuticle of the planta for about one-half to three-fourths of their lengths in such a way that when the planta is pulled inwards against turgor pressure they are so tilted that their apices, instead of projecting upwards, now project ventrally and are more or less parallel to the long axis of the proleg. Thus by retraction of the planta the crochets are disengaged. They are engaged again when the retractors are relaxed and turgor pressure evaginates the planta. The caterpillar therefore always pulls the planta inwards before shifting the position of the proleg. Ripley (1923) claims that in the Phalaenidae muscles are inserted in the proximal ends of the crochets, but this is not so either in that or related families. Species belonging to all of the principal superfamilies of the order have been examined, and in no case were muscles inserted in the crochets themselves.

Movements of the prolegs, other than retraction or evagination, are effected by variations of turgor pressure and by the muscles inserted in the body wall near their bases. The areas of the body wall adjoining those that give rise to the prolegs have numerous transverse, oblique, and longitudinal muscles as shown, for instance, in fig. 1.

It is probable that the retractors of the planta are, as in the Diptera, merely slightly specialized muscles of the body wall. Among the most simple ventral prolegs are those of the Adelidae (figs. 1 and 2). Whether this simplicity is brought about by reduction from a more complex proleg or whether it is

primitive will be discussed elsewhere. The prolegs of the Adelidae differ little in structure from the transverse creeping welts of the Diptera, and it seems certain that they resemble a stage in the evolution of prolegs from structures like creeping-welts even though they may not actually be one.

The ventral prolegs of the Zygaenidae, many Papilionoidea, Geometridae, Phalaenoidea, Bombycoidea, Saturnioidea, and Sphingidae are modified in a very characteristic fashion that enables them to cling to thin twigs with a force not possible to larvae of comparable size that have prolegs of the primitive type. When the larva is at rest, the twig is clasped between the prolegs in such a way that, if narrow enough, the prolegs may completely embrace it. At first sight it appears that this type of proleg is especially adapted for climbing about on plants. This impression receives support from the fact that it is the type found in all of the exclusively arboreal caterpillars that move about freely exposed and do not live in shelters of some kind as do most of the Microlepidoptera. Furthermore, the only terrestrial or semi-terrestrial larvae that have this kind of proleg are species of Phalaenoidea that can be shown in each case to be secondarily terrestrial.

Each of these specialised prolegs is somewhat tilted mesally towards the other of the same pair. The crochets, which do not differ in structure from those of the primitive type of proleg, are restricted to a straight or sinuate longitudinal line on the mesal side of the planta only. This arrangement of crochets is known as a mesoseries, and each crochet has its apex curved mesally and upwards. The planta is retracted and everted as in the Microlepidoptera. The retractor muscles often also consist of two sets, one arising on the body wall directly above the proleg dorsal to the spiracle and the other ventral to the spiracle (figs. 3-4), as in the Zygaenidae, Lycaenidae, Phalaenidae, Arctiidae, and Sphingidae. The centre of the planta in which the retractor muscles are inserted is, of course, always laterad from the crochets.

As in the primitive proleg, the crochets of the specialised type are disengaged when the planta is pulled inwards, but the action of the proleg as a whole is much more complex. A variable number of muscles are inserted on the base of the proleg itself (figs. 3-4), and in some groups, *e. g.* the Geometridae, muscles that arise near the spiracle are inserted on its middle outer face. Furthermore, there may be, as in the Geometridae, a specialised ventral musculature between the two prolegs of a pair. For instance, among the few Geometridae examined three obviously different patterns of ventral muscles were present, one of these including muscles that extended between the inner bases of the right and left prolegs.

The planta of the prolegs may sometimes function as a sucker when the larva is crawling on a smooth hard surface. At such times, as noted by Snodgrass (1935), the crochets are turned upwards and the planta is pressed against the surface so that its fleshy periphery inside the line of crochets seals a ventral hollow. In this position, a slight contraction of the planta retractors increases the volume of the central hollow without admitting air, and thus, by lowering the internal pressure, the central hollow functions as a vacuum cup. In some caterpillars, *e.g.* some Lycaenidae, there is a fleshy lobe between the centre of the planta and the mesal crochets. This lobe appears to function as an adhesive organ, and it is possible that a gland or glands may open on it.

When the prolegs of climbing forms are much reduced or modified to subserve other functions, their muscles may be reduced or lost. For instance, such Notodontidae as *Stauropus fagi* L., that have very long anal prolegs adapted for defence, now lack both the planta retractors and any other muscles they may once have had. The anal prolegs of these are moved entirely by muscles inserted on the sternal areas around their bases and by variations in turgor pressure. Other Notodontidae, such as *Cerura vinula* L., that have the anal prolegs adapted in another way for defence, still retain planta retractors.

The way in which the primitive type of proleg present in most Microlepidoptera was altered to become a specialised climbing organ is clear from a study of larval development in almost any of the Papilionoidea except some Hesperiidae and Papilionidae. As I have previously shown (Hinton, 1946), the first instar of all Papilionoidea has a primitive type of proleg with a complete circle of crochets. In successive larval instars of most species the crochets on the outer side of the planta become less numerous and smaller relative to those of the inner side at each moult until in the mature larva, they are lost altogether and only the mesal crochets are left to form a typical mesoseries. In the final instar of some Lycaenidae the process is not quite completed, and some of the outer crochets are still present. In the more specialised arboreal caterpillars, *e.g.* Sphingidae, Saturnioidea, Bombycoidea, and most Geometridae and Phalaenoidea there is no ontogenetic sequence of this kind, and a mesoseries is already present in the first instar.

Both the ventral and anal prolegs that are modified as climbing organs are, except for differences in their muscles other than planta retractors, remarkably similar in structure and appearance notwithstanding the fact that they have been independently evolved many times from a proleg like that of recent Microlepidoptera. This type of proleg has been independently evolved in the Zygaenidae, Papilionoidea, Geometridae, Phalaenoidea, Sphingidae, and in the Bombycoidea-Saturnioidea. Furthermore, it seems certain that it has been independently evolved at least three times within the Papilionoidea and may have been evolved several times in the series Bombycoidea-Saturnioidea. In short, it seems certain that a climbing type of proleg has been evolved no less than eight times within the Lepidoptera.

That the specialised harmoncopodous proleg of the Zygaenidae is of indendent origin seems clear from the fact that other members of the superfamily have prolegs of the primitive type, *e.g.* the Megalopygidae and Epipyropidae. A connection between the Zygaenoidea and any other superfamily containing species with specialised prolegs must have been through forms that had the primitive type of proleg, unless it is to be supposed that the apparently primitive prolegs of the Zygaenoidea are secondarily derived from the specialised type. A similar argument may be applied to the Geometroidea, in which superfamily the Geometridae have harmoncopodous prolegs and the Drepanidae stemmatoncopodous or primitive prolegs. In the Papilionoidea, the family Papilionidae contains species, *e.g.* the *glaucus* and *troilus* groups of *Papilio,* that retain a primitive type of proleg in the final instar. In other words, unless it be supposed that the primitive prolegs of these species of *Papilio* are derived from specialised prolegs, it must be supposed that the archetype of the family had a primitive type of proleg in all instars. A similar argument may be applied to the Lycaenidae, in which family some species have the outer row of crochets more or less well preserved in the final instar. The

other families and superfamilies listed in the preceeding paragraph are not related to one another but appear to be independently derived from stemmatoncopodous Ditrysia. The evidence for this is, as probably most lepidopterists will agree, especially strong in the case of the Sphingidae.

The few facts already cited are quite sufficient to show that if Kiriakoff's division of the bulk of the Lepidoptera into the Stemmatoncopoda and Harmoncopoda be accepted, it would result in placing all the early instars of the Papilionoidea and the final instar of the Hesperiidae, some Lycaenidae, and the *glaucus* and *troilus* groups of the genus *Papilio* in the Stemmatoncopoda, whereas the last one or two instars of most Papilionoidea would be included in the Harmoncopoda. Similarly, a most unnatural division would be made of the Zygaenoidea and Geometroidea.

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Department of Zoology, University of Bristol, Bristol, England

DISCUSSION OF DR. HINTON'S PAPER

Mr. KIRIAKOFF says: "Je regrette de n'avoir reçu aucun texte ni résumé de votre exposé ce qui m'empêche d'y répondre sur place en détail. Je puis cependant attirer votre attention sur deux points: 1. Les noms Stemmatoncopoda et Harmoncopoda ne sont pas le produit de mon imagination, mais ont été créés par KARSCH, 1898. 2. Vous insistez sur le côté phylogénétique de la question alors que dans ma classification j'avais expressément dit que cette derniére ne devait pas être consideréé comme un schéma phylogénétique."

Prof. M. HERING remarks: "Die Fragwördigkeit der Verwendung der äusseren Bildung der Abdominalfüsse verkleinert deren Bedeutung für die Aufstellung der Ordnung Zeugloptera."

Dr. W. HACKMAN says: "The inner anatomy of the larval ocelli of *Eriocrania* is very different from the same of other Lepidoptera *sensu stricto.* A comparison with the eye anatomy of the larva of *Micropteryx* (which has not yet been studied), could perhaps bring to light facts of systematic value."

Dr. DIAKONOFF says that without going into a discussion of the value of prolegs for systematics, it must be borne in mind that they and especially their crochets can be strongly influenced by the biology of the larva which may render them not fit for use as systematic characters.

LES ORGANES TYMPANIQUES DES LÉPIDOPTÈRES COMME CARACTÈRE SYSTÉMATIQUE ET PHYLOGÉNÉTIQUE

(The Structure of Tympanic Organs of the Lepidoptera as a Systematic and Phylogenetic Character)

par S. G. KIRIAKOFF

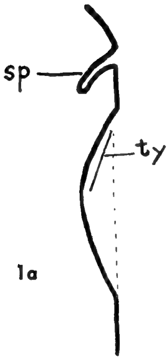
Les organes tympaniques ou tympanaux, observés dans plusieurs groupes des Lépidoptères, constituent sans aucun doute un caractère différenciel de tout premier ordre, dont on commence seulement à saisir l'importance tant au point de vue de la classification que de celui de la phylogénie. L'importance de ce caractère réside dans deux faits: en premier lieu c'est un organe de sens, très compliqué, dont la présence entraîne une modification souvent profonde des régions intéressées. En second lieu, sa présence n'a été jusqu'ici constatée que dans des groupes plus ou moin évolués, pour la plupart étant des "chefs de file" dans leurs séries phylétiques respectives.

Comme on sait, deux types principaux d'organes tympaniques ont pu être établis jusqu'ici, soit le type abdominal et le type thoracique. L'étude des formes possédant des organes tympaniques de l'un ou de l'autre de ces deux types, ainsi que l'étude des affinités de ces formes, nous mène à la conviction d'une origine polyphylétique des organes tympaniques. Il nous semble, en effet, que ces derniers ont dû se développer indépendamment tout au moins dans certains des groupes les plus évolués des diverses lignées phylétiques des Lépidoptères. Nous admettrons, par exemple, l'origine indépendante des organes tympaniques des Pyralididae, qui forment le groupe le plus progressiste de la série des Stemmatoncopodes. Nous admettrons, ensuite, la possibilité d'une origine commune des organes tympaniques des Geometridae et des Uraniidae, ces deux groupes étant relativement rapprochés l'un de l'autre et occupant la tête de la série phylétique qui comprend, entre autres, les "Rhopalocères". Nous rapprocherons les deux familles Thyatiridae et Drepanidae, qui, quoiqu'assez différents d'aspect, possèdent des organes tympanaux du même type. Quoiqu'appartenant à la même série phylétique que les Geometridae et les Uraniidae, les Thyatiroidea (= Cymatophoroidea) sont probablement le résultat d'une apomorphose secondaire.

L'origine des organes tympaniques des divers groupes appartenant à la sous-cohorte Papilioniformes est probablement monophylétique, avec divergences secondaires survenues très tôt, ou alors s'étant développées à un rythme tachytélique. Les Axioidea, encore peu étudiés, forment probablement un groupe apparenté, mais à affinités encore obscures.

Quant aux organes tympanaux thoraciques, rencontrés dans la plupart des groupes composant la sous-cohorte Noctuiformes, l'origine des ces organes est, semble-t-il, monophylétique, présentant également des divergences développées très tôt.

Les classifications modernes reconnaissent des groupes hiérarchiques d'un rang assez élevé (superfamilles) comprenant les formes à organes tympaniques des divers types énumérés plus haut. Ainsi, nous trouvons dans la plupart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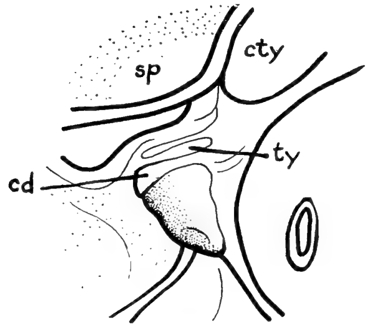
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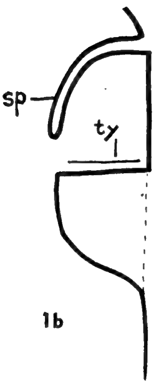
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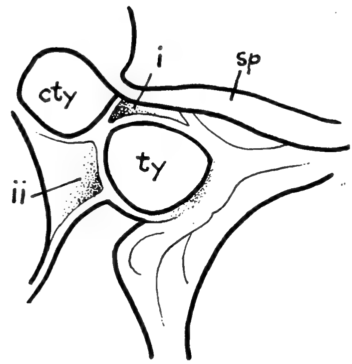
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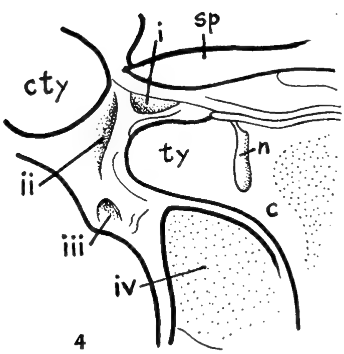
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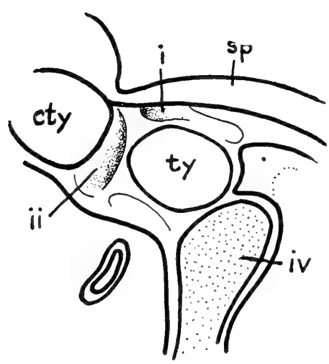
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des classifications récentes les superfamilles Pyralidoidea, Cymatophoroidea (ou Thyatiroidea), Geometroidea, Uranioidea (quelquefois réunie à la précédente), Axioidea et Noctuoidea.

La suite de cet exposé ne concernera que les formes munies d'organes tympanaux thoraciques que j'étudie spécialement depuis plusieurs années. Par une série d'exemples, je tâcherai de montrer que l'utilisation des organes tympanaux comme caractère différenciel peut mener à des changements parfois importants dans la classification.

Rappelons d'abord que les organes tympaniques sont en principe constitués par une membrane vibratile reliée au système nerveux central. Des expériences ont établi sans doute possible que ces organes jouent en effet le rôle d' "oreilles" chez les Lépidoptères. Dans le type thoracique, la membrane vibratile se trouve sur le troisième segment, dans une région modifiée et intéressant tant l'épimère que le post-notum.

Au cours de mes recherches, j'ai été amené à reconnaître une différenciation secondaire des organes tympaniques thoraciques en deux groupes, l'un à membrane tympanale plus ou moines verticale, s'écartant peu de la surface épimérale et supportée par un large cadre chitineux à sculptures souvent compliquées (type phalénoide), l'autre à membrane plus ou moins horizontale et formant comme le couvercle d'un enfoncement épiméral profond; le cadre est ici étroit et peu sculpté (type notodontoide) (fig. 1). La raison principale m'ayant amené à faire cette distinction réside dans le fait qu'un petit groupe éthiopien, très spécialisé et rapporté jusqu'ici à la famille Ctenuchidae, s'est trouvé posséder des organes tympanaux du même type que les familles Dioptidae et Notodontidae; ce groupe, par l'ensemble de ses caractères, doit être placé en tête d'une série phylétique comprenant les deux familles que je viens de nommer, et fournit donc la preuve d'une évolution rectilinéaire (ou orthogénétique) divergente dans le complexe Noctuide. Le groupe en question devint donc une famille (Thyretidae) (fig. 2), et le complexe Noctuide a été scindé en deux superfamilles: les Notodontoidea (Dioptidae, Notodontidae et Thyretidae) et les Phalaenoidea (les autres familles du complexe).

Voici maintenant quelques autres exemples.

Dans la famille Notodontidae, déjà citée, une sous-famille nouvelle, les Tarsolepidinae, a dû être créée; elle est caractérisée par un phragme scutal d'un

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EXPLANATION OF PLATE II

Fig. 1a. Diagram of section of phalaenoid type of tympanic organ.

Fig. 1b. Diagram of section of notodontoid type of tympanic organ.

Fig. 2. *Balacra erubescens* Joicey & Talbot: interior aspect of right tympanic organ (notodontoid, or *"type à timbale"*).

Fig. 3. *Comacla senex* Hbn. (Lithosiidae, Endrosinae): interior aspect of right tympanic organ.

Fig. 4. *Gnophria quadra* (Lithosiidae, Lithosiinae): interior aspect of left tympanic organ.

Fig. 5. *Atolmis rubricollis* (Lithosiidae, Endrosinae): interior aspect of left tympanic organ.

ABBREVIATIONS: c = *conjonctive;* cd = *cadre;* cty = *contre-tympan;* n = *nodule;* sp = *phragme scutal;* ty = *tympan;* i - iv = *poches du cadre.*

type aberrant, pratiquement identique à celui trouvé chez les Phalaenoidea, étroit, à peine convexe; rappelons que le phragme scutal du type notodontoide, caractéristique de la superfamille, est large, bombé, rappelant en forme la timbale tympanique, à laquelle il correspond parfaitement, et assurant ainsi la fixation du sac aérien. Les Tarsolepidinae, petit groupe assez différencié et à distribution géographique plutôt localisée, semble être d'origine assez récente; il est le résultat d'une apomorphose et mérite comme tel une place à part dans le système et un rang équivalent à celui des autres Notodontidae.

La nouvelle sous-famille des Rhodogastriinae offre un autre exemple d'apomorphose; ces Arctiidae possèdent des organes tympaniques d'un type s'écartant considérablement de celui observé communément dans la famille et rappelant à première vue le type dit "à timbale" des Notodontoidea; en réalité, il n'y a pas de parenté proche entre ces derniers et les Rhodogastriinae, et la ressemblance observée est le résultat d'une convergence. A côté des *Rhodogastria* de l'ancien monde, le même type particulier des organes tympanaux a été trouvé chez *Pelochyta* (et se retrouvera probablement dans quelques genres voisins), qui sont des Phegopterinae, sous-famille exclusivement américaine. Les Rhodogastriinae sont donc répandus dans les régions chaudes du monde, leurs origine devant être considérée comme relativement ancienne; la vicariance supposée des *Rhodogastria* avec les Phegopterinae n'existe donc pas, et l'isolement des formes en question dans une sous-famille distincte semble être justifiée phylogénétiquement.

Citons encore un ou deux exemples montrant que l'étude des organes tympanaux peut provoquer des changements dans la position non seulement des groupes hiérarchiques supérieurs (comme on pourrait le croire), mais aussi dans celle de simples genres.

Le genre *Eressa* Walker comprend, en outre des espèces orientales, quelques espèces africaines, de découverte plus récente: sur la base de quelques caractères secondaires, les espèces africaines ont été isolées dans le genre *Eressades* Bethune-Baker, mais ce dernier nom a été très généralement considéré comme un simple synonyme. Cependant, alors que les espèces orientales du genre *Eressa* ont des organes tympaniques rudimentaires comme les *Amata* et appartiennent donc à la famille Ctenuchidae, sous-famille Amatinae, les espèces africaines se trouvent en possession d'organes tympanaux identiques à ceux des *Balacra, Metarctia, Thyretes* etc., c'est à dire du type notodontoide ou à timbale. Le nom *Eressades* peut donc être appliqué à ces formes, et ce genre doit se placer non seulement dans une autre famille (Thyretidae), mais même dans une autre superfamille (Notodontoidea).

Un dernier exemple est tiré d'un travail non encore publié et traitant de la famille Arctiidae (à remarquer que les noms utilisés dans les divers chapitres de mes recherches: Nyctemeridae, Lithosiidae, Arctiidae, n'impliquent pas la reconnaissance des familles ainsi nommées: les relations réciproques de ces divers groupes demandent encore une étude, mais il semble, d'ores et déjà, peu probable que le rang familial puisse être conservé à la plupart de ces groupes). Il s'agit d'*Atolmis rubricollis* L. (fig. 5) Ce papillon a été généralement considéré comme un Lithosiidé et réuni le plus souvent dans le même genre avec *Gnophria* (=*Lithosia*) *quadra* L. (fig. 4). Il fut cependant rattaché aux Arctiidae par Hampson et, la grande autorité de cet éminent savant aidant, il y est resté dans les classifications récentes. Or, les organes tympaniques d'*Atolmis rubricollis*

sont pratiquement du même type que ceux de nombreux genres des Lithosiidae que j'ai été amené à réunir dans une nouvelle sous-famille Endrosinae (fig. 3). Ces genres sont caractérisés par une membrane tympanique plus ou moins circulaire, à fleur de l'épimère et totalement encerclée par le cadre, position qui n'a été observée jusqu'ici nulle part ailleurs. Les autres genres des Lithosiidae ont des organes tympaniques du type normal phalénoide, quoique souvent à caractères primitifs. Notre *Atolmis rubricollis* doit donc reprendre son ancienne place parmi les Lithosiidae; elle doit y être rangée dans la sous-famille Endrosinae, alors que son ancien congénère *Lithosia quadra* appartient au genre typique de l'autre sous-famille, les Lithosiinae, qui ne s'écarte que peu des Arctiidae.

Ces exemples pourraient être multipliés. Ils montrent de quelle importance pour la systématique et la phylogénie est l'étude des organes tympanaux. Se prêtant admirablement à la différenciation des unités taxonomiques supérieures jusque et inclus le genre, ces structures peuvent servir aussi à la différenciation spécifique, par l'étude complète de certains de leurs détails: poches du cadre, supports, étendue de la conjonctive etc. L'étude des organes tympaniques n'en est qu'à ses débuts; elle a néanmoins apporté déjà des changements importants dans la classification des Lépidoptères. Comme il existe plusieurs dizaines de milliers de formes possédant ces organes, un travail des plus fructueux attend les spécialistes qui voudront bien s'y attaquer.

SUMMARY

The significance of the tympanic organs of the Lepidoptera is based on two facts: 1) they are sense organs of great complexity; 2) they have been hitherto found only in some of the more specialized groups of the order. It is known that two main types of tympanic organs have been recognized, viz. the thoracic and the abdominal tympanic organs. The structure varies greatly within each of those types, and a number of secondary types have been recognized. This leads us to consider the probability of a polyphyletic origin of the tympanic organs. For instance, the tympanic organs of the Pyralididae ("pyralidoid" secondary type) seem to have evolved independently from those found in such groups as the Geometridae ("geometroid" secondary type), the Uraniidae ("uranioid" secondary type) and the Thyatiridae ("cymatophoroid" secondary type), while a common origin seems probable where the three latter groups are concerned. A secondary diphyletism also seems probable among the groups with thoracic tympanic organs. One series (Superfamily Notodontoidea) seems to have evolved from ancestral forms not unlike the modern Dioptidae; the most specialized group of this series are the African Thyretidae; the other series (Superfamily Phalaenoidea) seems to have originated from ancestral forms similar to the "primitive" Lithosiidae of the new Subfamily Endrosinae.

A few examples are given to illustrate the significance of the tympanic organs for classification and phylogeny of both the higher (Subfamily Tarsolepidinae of the Family Notodontidae; Subfamily Rhodogastriinae of the Family Arctiidae) and the lower (genus *Eressades* of the Family Ctenuchidae and the genus *Atolmis* of the Family Lithosiidae) groups.

Laboratory of Systematic Zoology, University of Ghent, Belgium

DISCUSSION OF MR. KIRIAKOFF'S PAPER

Dr. A. DIAKONOFF asks whether the tympanic organs must be regarded as being of monophyletic or of polyphyletic origin? In the latter case their value for systematics becomes somewhat dubious: if these organs developed independently several times in different groups, their presence is of course no indicator to the relationship of those groups.

Mr. KIRIAKOFF: Dans mon opinion, l'origine des organes tympaniques est au moins diphylétique: a) o.t. thoraciques, b) o.t. abdominaux. Je ne vois cependant pas en quoi cela puisse diminuer leur importance pour la systématique et la phylogénie. Dans chaque groupe développé indépendamment une évolution subséquente s'est produite, assez importante pour pouvoir être utilisée dans les buts précités.

Prof. M. HERING says: Ich glaube dass die Gruppierung des Herrn KIRIAKOFF Korrekt ist. Man kann die genannten "Familien" des Phalaenoidea als eine einzige Familie betrachten — ausgenommen villeicht die Lymantriidae, deren Larven constant durch das Besitz der "Trichterwarzen" gekennzeichnet sind. Auch die Agaristidae stehen abseits, bei ihnen kann der "Museums-Mann", wenn er sie gegen das licht hält, an der Basis eine Art "Fenster" beobachten, was auf eine Verschiedenheit des Tympanalorgans hinweist.

Mr. KIRIAKOFF: Tout à fait d'accord. Je vais étudier prochainement les Agaristidae et suis persuadé que mes résultats corresponderont avec votre opinion.

Prof. LORKOVIC remarks: Wenn Sie die beiden Typen alis monophyletisch entstanden glauben, haben Sie den Versuch gemacht den einen Typ aus dem anderen auszuführen, dass heist, nur bildlich, welche Umformungen des einen Typus in den anderen führen können. Das ist wichtig, da man manchmal sieht, dass sehr einfache Umformungen zum erheblichen Unterschieden im Aussehen führen können.

Mr. KIRIAKOFF: Comme je l'ai dit, je considère les deux types — abdominal et thoracique — comme s'étant développés tout à fait indépendamment l'un de l'autre. Il ne peut donc être question de changement structurel menant d'un de ces types à l'autre. D'autre part, les deux types secondaires des o.t. thoraciques (type phalénoide et type notodontoide) doivent être considérés comme l'étant différenciés trés tôt, à un moment de l'évolution de leur ancêtre commun ou la structure des o.t. ètait voisine de celle trouvée actuellement dans la sous-famille Dioptinae. Phylogénétiquement parlant, le type notodontoide doit donc être considéré comme étant plésiomorphe, quoique s'écartant en fait davantage du type primitif observé chez les Dioptinae.

ÜBER DEN WERT WENIG BEACHTETER MERKMALE FÜR DIE KLASSIFIKATION DER SCHMETTERLINGE

(On the Value of Little Noticed Characters for the Classification of the Lepidoptera)

von TH.A. WOHLFAHRT

Während man früher die Einteilung der Schmetterlinge nach äusseren Merkmalen vornahm und in Färbung und Zeichnung, im Geäder, den Fühlern, Palpen und Beinen allein wesentliche Unterschieds-merkmale sah, wurden später bekanntlich anatomische Einzelheiten bei der Bestimmung zugezogen. Der taxonomische Wert der feineren Körpergliederung, der Genitalarmaturen, der Tympanalorgane, der Geschmackskegel wurde erkannt und zur Grundlage der Abgrenzung der systematischen Einheiten gemacht, wobei eine immer grössere Annäherung an ein phylogenetisch begründetes System erfolgte. Je niedriger die Kategorie wird, desto schwieriger ist erfahrungsgemäss die Trennung, desto subjektiver wird die Einstellung der Einheit gegenüber. Eine letzte Klärung ist wohl nur von unten her möglich, indem man von der kleinsten Kategorie ausgeht, von der Population. Sie bewohnt ein räumlich eng umgrenztes und verhältnismassig leicht übersehbares Gebiet, welches von biologischen und ökologischen Faktoren bestimmt wird. Ihr Studium eröffnet das Verständnis für den Komplex der sogenannten geographischen Rasse, die sich aus vielen Populationen zusammensetzt (Burgeff 1951). Die Individuen verschiedener geographischer Rassen, die untereinander noch unbeschränkt fortpflanzungsfähig sind, pflegen wir unter dem Begriff der Art zusammenzufassen, doch haben Entomologie und Ornithologie wie das studium der Molluscen gelehrt, dass der phylogenetische Zusammenhang räumlich weit entfernter Rassen den Rahmen des klassischen Artbegriffes sprengen kann. Wir gelangen so zum Rassenkreis (Rensch 1926). Alle diese Kategorien sind nicht immer leicht zu trennen, zumal die Verwendbarkeit der einzelnen taxonomischen Merkmale sehr verschieden ist. Was bei der einen sichere Ergebnisse liefert, kann bei einer anderen völlig unbrauchbar sein. Die Merkmale zur Unterscheidung von Rassen sind zumal bei den Schmetterlingen gegenüber den Unterscheidungs-merkmalen der höheren Kategorien oft besonders schwer darzustellen. Sie werden deshalb häufig durch Worte umschrieben, die eine recht verschiedene Deutung zulassen. Es zuzugeben, dass die oft so distinkten charakteristischen Farbnuancen der Schmetterlinge kaum zu bezeichnen sind. Umso mehr sollte man versuchen, auch exakt messbare Merkmale zu finden.

Im Hinblick auf die gegebenen Tatsachen müssen zwei Dinge gesondert erwähnt werden. Jedes erbeutete Individuum gehört einer Population an und stellt einen realisierten Fall ihrer Variationsbreite dar, die uns a priori unbekannt ist. Ausserdem repräsentiert es einen Phänotypus, dem wir nicht ansehen können, wie weit seine Merkmale durch Modifikation oder durch verschiedenartige Erbfaktoren bedingt sind. Die ideale Lösung ist die genetisch-entwicklungsgeschichtliche Analyse. Sie konnte bisher nur in wenigen Fällen bei Schmetterlingen durchgeführt werden, wie bei *Ephestia kühniella*

Z. durch Kühn und seine Mitarbeiter (Kühn und Henke, 1929). Eine Analyse der Zeichnungselemente durch Auszählen der Schuppen ist bei grosseren Faltern sowieso praktisch kaum durchführbar, abgesehen davon bereitet die Beschaffung von grösseren Freilandserien von benachbarten Lokalformen oder auch von Arten zur Variationsanalyse meist erhebliche Schwierigkeiten. Eine exakte Diagnose ist aber in jedem Fall erforderlich. Zum anderen: Die Beschreibung einzelner "Rassen" erfolgt wegen der erwähnten Schwierigkeiten in der Materialbeschaffung mitunter rein intuitiv auf Grund von wenigen Exemplaren, so dass Variationsbreite und Modifikabilität unerkannt bleiben, von möglicher Kolonievariabilität ganz abgesehen. Die Existenz irgendwie umweltbedingter Unterschiede auch bei Schmetterlingen ist evident, doch haben viele ihrer Benennungen wohl nur heuristischen Wert, solange die feineren Zusammenhänge unerkannt bleiben. So sind zum Beispiel vom Segelfalter *Iphiclides podalirius* L. eine Menge angeblich geographischer Rassen beschrieben worden, deren Unterschiede sich fast allein auf die 2. Generation beschränken (Lempke, 1932/33). Wenn auch bei zweibrütigen Schmetterlingen der gemässigten Zonen in der 2. Generation infolge der gegenüber der Diapause abgekürzten Entwicklung und ihrer erhöhten Beeinflussbarkeit durch äussere Faktoren eine grössere Modifikabilität gegeben scheint, so ist es doch unwahrscheinlich, dass sich die 1. Generation überhaupt nicht analog differenziert haben soll.

Um diesen Fragen nachzugehen, haben wir in den vergangenen Jahren die zeitliche Variabilität des Segelfalters untersucht. Hierbei waren folgende Punkte zu beachten. Zunächst durften nur Freilandtiere einer einzigen Population verwendet werden, ferner waren die Untersuchungen über mehrere Jahre auszudehnen. Es mussten planlos möglichst grosse Serien gesammelt werden, wobei aber die Art nicht zu sehr dezimiert werden durfte, um den Bestand zu erhalten. Es wurden deshalb hauptsächlich die häufigeren ♂♂ verwendet, die wenigen erbeuteten ♀♀ zeigen dieselben Ergebnisse mit wenigen Ausnahmen, die auf das zu geringe Material zurückzuführen sind. Ausserdem war der Witterungsablauf für den betreffenden Flugplatz möglichst genau zu ermitteln, auf welche Beziehungen ich infolge der Kürze der Zeit nur andeutend eingehen kann. Später waren genau determinierte Freilandserien anderer Lokalitäten zum Vergleich heranzuziehen.

Eines der bezeichnendsten Merkmale des Segelfalters ist die Gestalt seiner Flügel. Zumal die Schwanzspitzen der Hinterflügel werden mitunter als besonderes Rassemerkmal angegeben, ohne dass in der Literatur exakte Angaben über ihre Länge zu finden wären. Da neben einer Analyse der Färbung und Zeichnung der Falter auch die Flügelform berücksichtigt werden sollte, wurde ein Liniensystem entwickelt, nach welchem die Flügelproportionen erfasst werden konnten (Abb. 1). Bedingung war die Präparation des Falters derart, dass die Hinterränder der beiden Vorderflügel, d. h. distales und proximales Ende jeder 2. Analader auf einer Geraden lagen. Die Verbindung der beiden äusseren Vorderflügelspitzen wurde als "Spannweite" bezeichnet, während die grösste Länge der beiden Vorderflügel zusammen mit der Thoraxbreite die "Flugspanne" ergibt (= weiteste Ausbreitung der Flügel während des Fluges). Der Hinterflügel ergab folgende Masse: die "Hinterflügellänge" vom distalen Ende der 1. Cubitalader bis zum weitesten cranialwärts gelegenen Punkt des Hinterflügels, die "Hinterflügelgesamtlänge"

von eben diesem Punkt bis ans Ende des Schwanzfortsatzes der Media 3' (Hinterflügelgesamtlänge weniger Hinterflügellänge ergibt die "absolute Schwanzlänge"), dazu wurde noch die "Hinterflügelbreite" festgestellt (= Lot vom distalen Ende der Subcosta auf die Hinterflügellänge und Verlängerung dieses Lotes bis zum Schnitt mit dem Innenrand). Die Zahl der berücksichtigten Masse ist mit den hier angegebenen nicht erschöpft, sie sollen einer späteren Besprechung vorbehalten bleiben.

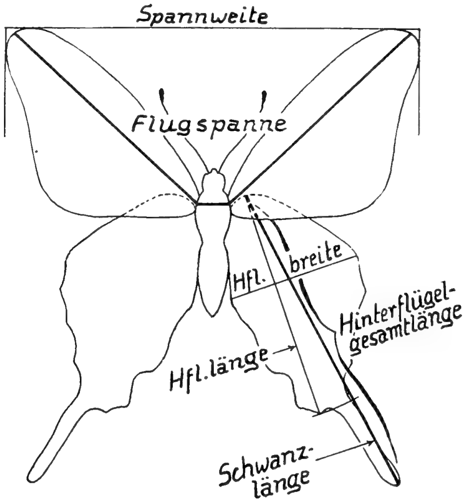

Abb. 1. Measurements for computing wing proportions. (*Flugspanne* = greatest wing expanse; *Spannweite* = wing spread; *Hfl. breite* = width of hindwing; *Hfl. länge* = length of hindwing; *Schwanzlänge* = tail length; *Hinterflügelgesamtlänge* = total length of hindwing)

Derartige Messungen sind, soweit mir bekannt, bisher in der Lepidopterologie sehr wenig verwendet worden, wenn man von gelegentlichen Messungen der Vorderrandslänge der Vorderflügel zur Grössenbestimmung absieht, wie sie wohl zuletzt von Beall und Williams (1945) zur Untersuchung der geographischen Variation von *Danaus plexippus* ausgeführt wurden.

Um unmittelbar vergleichbare Werte zu erhalten, wurden aus den absoluten Massen Relativwerte berechnet, also ein kleinerer empirischer Wert in % eines grosseren ausgedrückt. Dieses Verfahren konnte teilweise auch auf die Bearbeitung von Zeichnungselementen erfolgreich angewendet werden. Besonders wertvoll sind diese Bezugszahlen deshalb, weil man mit verhältnismässig kleinen Serien noch statistisch brauchbares Material erhält, da sonst sehr ungleiche Individuen derselben Art in dem Verhältnis ihrer Teile meist wenig voneinander abweichen, also die Streuung klein bleibt. So ergab sich zum Beispiel bei der geringen Anzahl von nur 21 Tieren eine nahezu ideale binomiale Verteilung in der Variation eines Relativwertes. Alle derart exakt greifbaren Merkmale wurden nach Möglichkeit variations-statistisch erfasst (M, m, V, v). Es könnte der Einwand erhoben werden, dass die Flügel infolge ihrer mechanischen Beanspruchung im Leben der Falter einer fortschreitenden Formveränderung unterliegen. Praktisch werden jedoch nur Freilandtiere erbeutet, die schon einige Zeit geflogen sind, sodass dieser Fehler

wohl kaum ins Gewicht fällt und sich im Bereich der allgemeinen Fehlergrenze halten wird, die durch Messungenauigkeiten und verschiedene Deformationen während der Präparation der Tiere bedingt sind.

Im Folgenden seien einige Ergebnisse mitgeteilt, welche dazu geeignet sind, die dargestellten Tatsachen zu erläutern und die Brauchbarkeit der Flügelmasse für feinere systematische Untersuchungen aufzuzeigen. Die grundlegenden Messungen sind an Faltern eines engbegrenzten Flugplatzes an den Hängen des Maintals nordwestlich von Würzburg aus den Jahren 1947-51 durchgeführt worden. Zum Vergleich standen Freilandserien aus Oberbayern (Leizachtal) und Nordtirol (Brandenberg), ferner aus der Gegend nördlich Belgrad (Syrmien: Fruska Gora) und aus Kleinasien (Nordsyrien: Marasch im Zentral-Taurus) zur Verfügung. Es ist mir eine angenehme Pflicht, für die leiheweise Überlassung des Vergleichsmaterials der Zoologischen Sammlung des Bayerischen Staates sowie Herrn E. Pfeiffer in München und Herrn Wolfsberger in Miesbach herzlich zu danken.

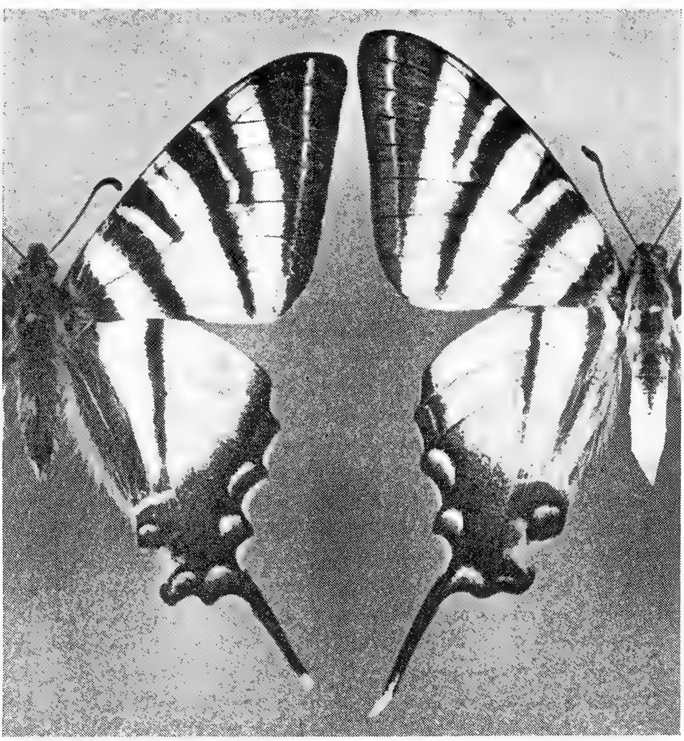

Abb. 2. *Iphiclides podalirius* ♂ from Unterfranken, 1st and 2nd generations.

Abb. 2 zeigt je einen unterfränkischen Segelfalter der 1. und 2. Generation. Besonders auffallend sind neben der bekannten Aufhellung des Abdomens und des Innenrandes der Hinterflügel bei dem Sommertier die viel gestrecktere Flügelform und die längeren Schwanzspitzen. Man hat den Eindruck, als ob der Sommerfalter trotz geringerer Spannweite grösser

sei. Derartige Formverschiedenheiten müssen sich entsprechend in den Flügelmassen auswirken.

Abb. 3 zeigt die Variabilität der Grösse beider Generationen, dargestellt durch die Spannweite und Flugspanne, aufgezeichnet als Summenkurven in % der Häufigkeit jeder Grösseneinheit. Der Unterschied der beiden Generationen in der Flugspanne ist im Verhältnis erheblich grösser als in der Spannweite. Ausserdem erheben sich die Kurven der Spannweite und Flugspanne bei den Frühjahrstieren viel sanfter, es müssen hier also bedeutend mehr kleine Tiere vorhanden sein, als in der Sommergeneration. Wir wollen diese Tatsache zur Kenntnis nehmen und werden später noch einmal darauf zurückkommen.

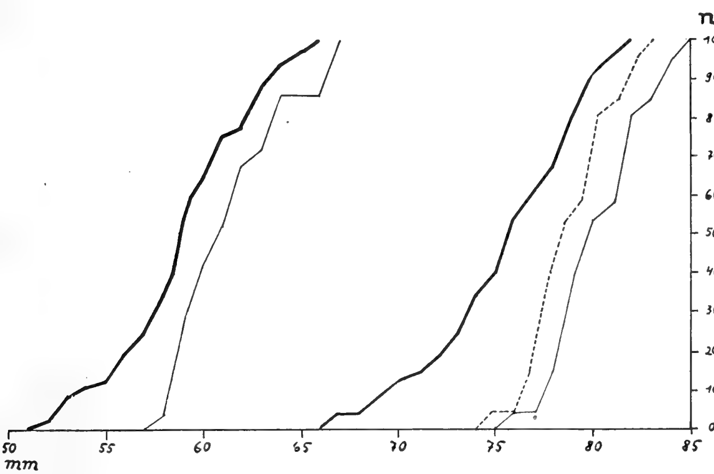

Abb. 3. Graph of variability of size in % of frequency for the two generations shown in Abb. 2. Left curves for *Spannweite,* right curves for *Flugspanne.* Heavy line gen. vern., light line gen. aest.

Um das Verhältnis von Spannweite und Flugspanne in den beiden Generationen zahlenmässig zu erfassen, können wir Spannweite und Flugspanne in ihrer Abhängigkeit voneinander so darstellen, dass wir die Spannweite in % der Flugspanne ausdrücken. Wir kommen damit zur "relativen Spannweite" (Abb. 4). Je weniger steil der Flügel und je grösser die Spannweite ist, desto höher wird der Wert für die relative Spannweite sein, Während umgekehrt steile Flügel eine kleine Spannweite bewirken und folglich auch einen kleinen Wert für die relative Spannweite ergeben. Somit ist die relative Spannweite der Ausdruck für die Steilheitendes Vorderflügels und damit für das auffallendste Merkmal der Oberflügelgestalt des Segelfalters.

Abb. 5 zeigt den grossen Unterschied in der relativen Spannweite zwischen 1. und 2. Generation der unterfränkischen Segelfalter im Vergleich der eingezeichneten Mittelwerte, zugleich wird deutlich, wie weit bei dem Relativmass sich schon das wenige Material an die Binomialkurven angleicht.

Während die Frühjahrstiere der Jahrgänge 1947-51 alle sehr einheitlich sind, unterscheiden sich die Sommerfalter des Jahres 1948 wesentlich von den übrigen Sommertieren der genannten Jahrgänge. Die sensible Periode

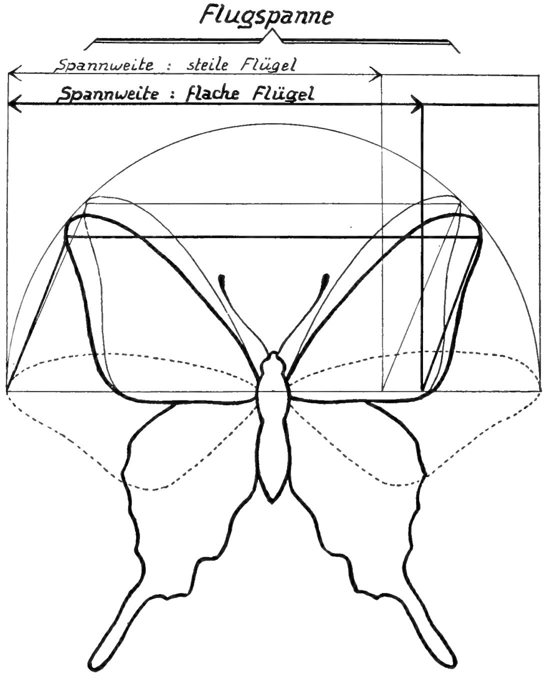

Abb. 4. Relative *Spannweite* for *I. podalirius.*

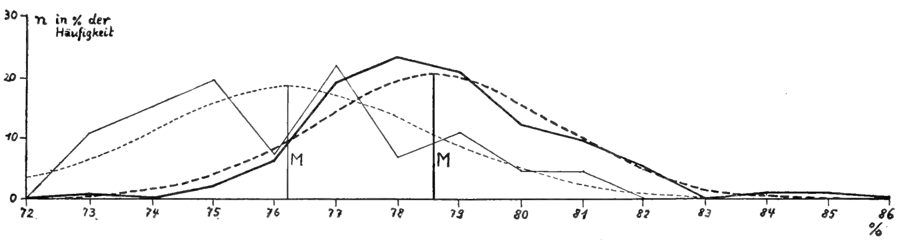

Abb. 5. Graph showing difference in *Spannweite* for the two generations. (See Tab. II for full data.)

der Puppen der Sommerfalter 1948 fiel in nasskalte Witterung, die das Aussehen dieser Tiere in Richtung der Frühjahrsgeneration modifizierte. Wir werden darauf bald zurückkommen. Vergleicht man jedoch die Variationsbreite der relativen Spannweite der Sommertiere 1948 mit denjenigen der Jahrgänge 1947-50 (Abb. 6), so findet sich, dass sie von diesem Einfluss unberührt geblieben sind. Wir dürfen also annehmen, dass diese Flügelproportion wenigstens der unterfränkischen Population durch normale Witterungseinflüsse nicht modifizierbar ist.

Vergleicht man dagegen die relativen Spannweiten verschiedener geographisch weit getrennter Populationen miteinander, so ergeben sich ganz erhebliche Unterschiede (Tabelle I). In der 1. Generation stimmen die

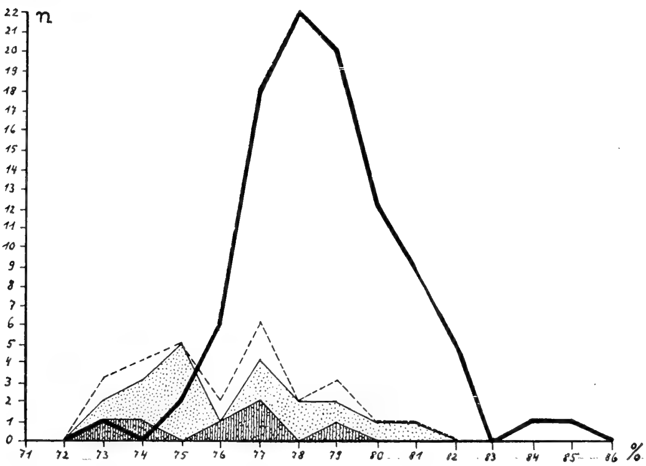

Abb. 6. Relative *Spannweite:* heavy line = gen. vern. 1947-51; dashed line = gen. aest. 1947-50; hatched area = gen. aest. 1948; dotted area = gen. aest. 1947, 49, 50. Full data in Tab. I.

Werte der oberbayerischen Stücke genau mit den Werten der Unterfranken überein, während die Werte der nordtiroler Form etwas höher liegen. Dagegen liegen die Werte der 1. Generation aus Nordsyrien noch unter denen der unterfränkischen Sommergeneration. Sie weichen nur unwesentlich von denen der nordsyrischen Sommertiere ab, die wiederum niedriger sind als diejenigen der in sich einheitlichen jugoslavischen und unterfränkischen Sommertiere. Die 1. Generation der bearbeiteten kleinasiatischen Population weicht also in einem wesentlichen Merkmal von den Europäischen Faltern ab, ebenso lassen sich die alpinen einbrütigen Stücke des Vergleichsmaterials ohne weiteres nach dem Durchschnitt ihrer relativen Spannweite von den Tieren aus den Mittelgebirgen Mitteleuropas abtrennen.

Abb. 7 zeigt die Variabilität der relativen Schwanzlänge (= Schwanzlänge in % der Hinterflügelgesamtlänge) der unterfränkischen Tiere in % Verteilung. Noch besser als bei dem vorigen Merkmal tritt hier die beinahe ideale

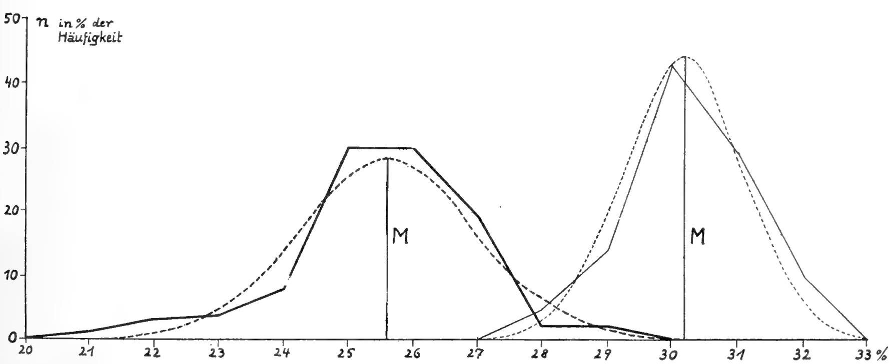

Abb. 7. Variability of relative tail-length (in % of frequency of each class) in the two generations. Full data in Tab. II.

Tabelle 1. RELATIVE *SPANNWEITE* OF THE TWO GENERATIONS OF VARIOUS WIDELY SEPARATED POPULATIONS OF *IPHICLIDES PODALIRIUS**

Population	Jahr	gen. vern.							einbrütig						
		n ♂	M	m	−	+	σ	v	n ♂	M	m	−	+	σ	v
Unterfranken, Maintal nordwestlich von Würzburg	1947	6	79		77.8	80.7			5	77		73.4	81.4		
	1948	10	78		76.6	81.9			6	76		73.0	78.6		
	1949	22	78		73.2	81.3			4	76		75.0	76.8		
	1950	23	78		75.0	81.9			12	76		72.6	79.8		
	1951	36	79		75.6	85.3									
	vern. 1947-51 aest. 1947-50	97	79	0.2	73.2	85.3	1.94	2.4	27	76	0.4	72.6	81.4	2.2	2.8
Oberbayern Leizachtal	1942, 45, 47, 48, 49, 50	19	79	0.6	73.9	83.4	2.61	3.3	einbrütig						
Nordtirol Brandenberg	1939, 41, 44, 50	12	81	7.7	76.7	85.1	2.23	2.7	einbrütig						
Nordsyrien Marasch im Zentral-Taurus	vern. 1930 aest. 1929	6	75		71.9	77.4			26	74	0.4	69.5	78.4	2.08	2.8
Syrmien Fruska-Gora	aest. 1935								9	76		73.7	78.4		

* n = number of individuals, M = mean width, m = medium deviation of mean, + = maximal value, − = minimal value, σ = deviation, v = variation coefficient.

Tabelle II. RELATIVE TAIL-LENGTHS OF THE TWO GENERATIONS OF THE SAME POPULATIONS.

Population	Jahr	gen. vern.							gen. aest.						
		n♂	M	m	—	+	σ	v	n♂	M	m	—	+	σ	v
Unterfranken, Maintal nordwestlich von Würzburg	1947	6	**25**		24.0	27.0			5	31		31.0	32.0		
	1948	10	**25**		22.0	27.0			6	**28**		23.0	30.0		
	1949	22	**26**		23.3	28.5			4	31		29.2	31.7		
	1950	23	**26**		23.1	27.8			12	**30**		28.2	31.2		
	1951	35	**25**		21.4	28.9									
	vern. 1947-51 aest. 1947, 49, 50	96	**25**	0.14	21.4	28.9	1.42	5.5	27	**30**	0.2	28.2	32.0	0.9	2.97
Oberbayern Leizachtal	1942, 45, 47, 48, 49, 50	19	**26**	0.5	22.4	29.8	2.16	8.3	einbrütig						
Nordtirol Brandenberg	1939, 41, 44, 50	11	**23**		20.3	25.9			einbrütig						
Nordsyrien Marasch im Zentral-Taurus	vern. 1930 aest. 1929	6	**27**		25.3	28.3			24	**32**	0.3	29.7	35.9	1.62	5.0
Syrmien Fruska-Gora	aest. 1935								9	**32**		29.5	33.0		

Angleichung an die Binomialverteilung hervor. Zugleich zeigen die Mittelwerte den grossen Unterschied in der Schwanzlänge der beiden Generationen. Dieses Merkmal scheint modifizierbar zu sein. Die Werte für die Tiere des kalten Sommers 1948 sind denen der unterfränkischen Frühjahrsgeneration genähert (Tabelle II). Auch hier weisen die geographisch weit getrennten Populationen charakteristische Unterschiede auf: wiederum unterschieden sich die Alpentiere von denen der Mittelgebirge, während die kleinasiatische Population auch in der Frühjahrsgeneration grössere Werte als die Mitteleuropäer zeigt. Also auch hier ein charakteristischer Unterschied bereits in der 1. Generation! Im Gegensatz zur relativen Spannweite schliessen sich jedoch die jugoslavischen Sommertiere in ihrer relativen Schwanzlänge an die Kleinasiatischen Sommertiere an.

Ein ähnliches Bild der Modifizierbarkeit ergibt die Ausdehnung der Gelbfärbung der Schwanzspitzen, ausgedrückt in % der Schwanzlänge (Abb. 8) zeigt die Variabilität der unterfränkischen Tiere. In der 2. Generation ist das Resultat des kalten Sommers 1948 gesondert hervorgehoben, die Ausdehnung des gelben Bereiches stimmt völlig mit demjenigen der 1. Generation überein.

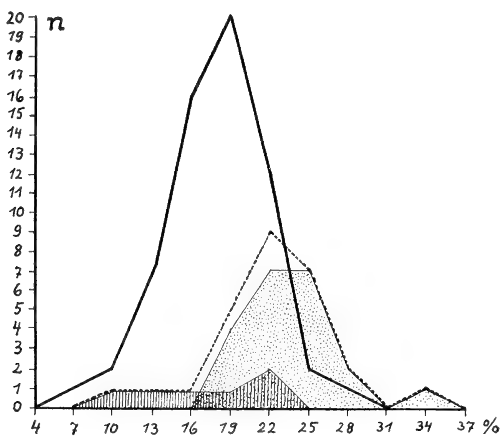

Abb. 8. Variability of % of distal yellow in total length of tail. Heavy line = gen. vern. 1947-50; others as in Abb. 6. Full data in Tab. III.

Der tabellarische Vergleich (Tabelle III) ergibt wiederum ein anderes Bild. Die geringsten gelben Spitzen hat die nordtiroler Population. Die den fränkischen ein. Die Frühjahrstiere aus Syrien zeigen innerhalb der 1. oberbayerischen Tiere nehmen eine Mittelstellung zwischen den alpinen und Generation die hellsten Schwanzspitzen. In der 2. Generation schliessen sich die Jugoslaven den Unterfranken der heissen Sommer an, während die Schwanzspitzen der Kleinasiaten vom Taurus besonders extrem aufgehellt sind.

Ebenfalls modifizierbar ist die Färbung des Abdomens, doch will ich darauf noch nicht näher eingehen.

Tabelle III. RELATIVE DEVELOPMENT OF DISTAL YELLOW IN TAILS OF THE TWO GENERATIONS OF THE SAME POPULATIONS.

Population	Jahr	gen. vern.							gen. aest.						
		n ♂	M	m	—	+	σ	v	n ♂	M	m	—	+	σ	v
Unterfranken, Maintal nordwestlich von Würzburg	1947	6	**18**		12.5	25.0			5	**26**		18.8	34.8		
	1948	10	**16**		8.8	20.5			6	17		10.0	23.0		
	1949	22	17		5.7	27.4			4	**22**		19.6	25.0		
	1950	23	**19**		14.8	22.7			12	**23**		18.3	26.7		
	1951	35	**18**		7.9	26.3									
	vern. 1947-51 aest. 1947, 49, 50	96	**18**	0.4	5.7	27.4	3.82	21.5	21	23	0.8	18.3	34.8	3.7	15.8
Oberbayern Leizachtal	1942, 45, 47, 48, 49, 50	19	**14**		7.5	19.6			einbrütig						
Nordtirol Brandenberg	1939, 41, 44, 50	11	**12**		1.3	20.5			einbrütig						
Nordsyrien Marasch im Zentral-Taurus	vern. 1930 aest. 1929	6	**20**		15.7	29.8			24	**28**	4.3	15.4	40.9	21.4	75.9
Syrmien Fruska-Gora	aest. 1935								9	23		15.6	32.1		

Es gibt aber auch Proportionsmerkmale, die in allen Populationen ganz gleichmässig variiren, sodass ihnen nichts besonderes zu entnehmen ist. Ein solches Merkmal ist das Verhältnis Länge: Breite der Hinterflügel, die "relative Hinterflügelbreite", ausgedrückt durch die Breite in % der Länge (ohne Berücksichtigung der Schwanzspitzen). Hier streuen alle Populationen beinahe einheitlich (Tabelle IV), nur die Sommertiere aus Syrien scheinen vielleicht mehr zufällig im Verhältnis etwas breitere Hinterflügel zu haben.

Auch der ♂-Genitalapparat eignet sich zur Rassendiagnose beim Segelfalter nicht, da er nach unveröffentlichen Untersuchungen meines Mitarbeiters Joh. Bubmann selbst bei weit getrennten Populationen keine Unterschiede aufweist.

Aber nicht allein die Relativmasse, auch die absoluten Messergebnisse können Anregungen geben. Wir erinnern uns an die eingangs festgestellte Tatsache, dass in der Frühjahrsgeneration unverhältnismassig viel mehr kleine Individuen anzutreffen waren, als in der Sommergeneration, was sich entsprechend im Variationspolygon der Spannweite ausdrückt (Abb. 9). Man erkennt hier die Komponente der kleinen Individuen deutlich in dem kleinen Gipfel links aussen. Es sind Hungertiere und wahrscheinlich überwiegend Nachkommen der 2. Generation des Vorjahres. Diese ist an sich schon in Unterfranken in weit geringerer Individuenzahl vorhanden als die 1. Generation, dazu finden ihre Nachkommen im Spätsommer so schlechte Ernährungsbedingungen vor, dass sicher viele Raupen gar nicht bis zur Verpuppung kommen. Der Rest liefert wohl die Zwerge des nächsten Frühjahrs, sodass wir mit einiger Wahrscheinlichkeit die grossen Individuen als unmittelbare Nachkommen der Frühjahrsgeneration des Vorjahres und die kleinen als Nachkommen der Sommergeneration werten können.

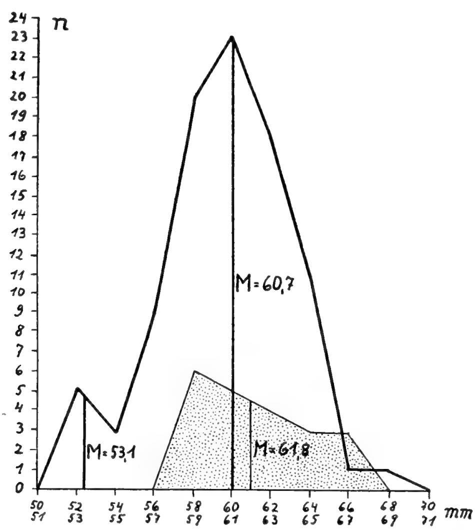

Abb. 9. Variation polygon for the *Spannweite* of the two generations. Open area = gen. vern.; dotted area = gen. aest. Means of both gen. vern. size groups computed separately.

Tabelle IV. RELATIVE BREADTH OF HINDWING (IN % OF LENGTH, OMITTING TAIL; SEE ABB. 1) IN THE TWO GENERATIONS OF THE SAME POPULATIONS.

Population	Jahr	gen. vern.							gen. aest.						
		n ♂	M	m	—	+	σ	v	n ♂	M	m	—	+	σ	v
Unterfranken, Maintal nordwestlich von Würzburg	1947	6	**56**		54.8	57.3			5	**57**		55.1	58.2		
	1948	10	**57**		54.8	58.9			6	**56**		54.3	58.1		
	1949	22	**55**		49.0	58.3			4	**54**		49.9	58.1		
	1950	23	**57**		53.6	59.3			12	**57**		54.5	59.1		
	1951	36	**56**		53.2	59.9									
	vern. 1947-51 aest. 1947-50	97	**56**	0.2	49.0	59.9	1.78	3.1	27	**56**	0.4	49.9	59.1	1.9	3.4
Oberbayern Leizachtal	1942, 45, 47, 48, 49, 50	19	**55**	0.5	51.8	59.1	2.12	3.8	einbrütig						
Nordtirol Brandenberg	1939, 41, 44, 50	12	**56**	0.8	51.7	59.5	2.68	4.8	einbrütig						
Nordsyrien Marasch im Zentral-Taurus	vern. 1930 aest. 1929	6	**56**		52.0	61.1			26	**58**	0.3	54.5	63.2	1.78	3.1
Syrmien Fruska-Gora	aest. 1935								9	**57**		53.7	59.9		

Die dargestellten Beispiele sind ein kleiner Ausschnitt aus einem umfangreichen Material, das viele Fragen aufwirft. Da sicher nicht wenige Merkmale modifizierbar sind, wird man in der Beurteilung von geographischen Rassen vorsichtig sein müssen, wenn nicht genügend Serien aus mehreren Jahren vorhanden sind. Wir sind dabei, die Modifizierbarkeit der Merkmale des Segelfalters experimentell zu prüfen, doch liegen hier noch keine abschliessenden Ergebnisse vor, Auch soll die Untersuchung relativer Proportionsmasse vergleichend an anderen Schmetterlingen ausgeführt werden.

Ich bin mit meinen Ausführungen am Ende. Ich weiss, dass auch die geschilderten Proportionsmerkmale längst nicht in allen Fällen taxonomisch anwendbar sind, doch würde dieser Hinweis völlig genügen, wenn sie in einigen Fällen mit Erfolg zur Klärung strittiger Fragen beigezogen werden könnten.

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ZUSAMMENFASSUNG

Die vorliegenden Untersuchungen betreffen die normale Variabilität bestimmter Flügelproportionen der beiden Generationen des Segelfalters (*Iphiclides podalirius* L.) im Vergleich miteinander. Unterschiede zwischen Generationen und geographischen Rassen werden bei Lepidopteren im allgemeinen durch Worte beschrieben, die selbst bei guter Kenntnis der betreffenden Art recht verschiedene Deutung zulassen. Dem gegenüber wurde bei Freilandserien einer Population aus dem Maintal nordwestlich von Würzburg in den Jahren 1947 bis 1951 versucht, an den genannten Merkmalen objektive Zahlenwerte zu ermitteln. Zum Vergleich standen einige Freilandserien von anderen Fundorten zur Verfügung.

Durch Verbindung bestimmter Messpunkte an den Flügeln ergaben sich Masseinheiten, welche die Berechnung vergleichbarer Relativwerte erlaubten. Der Vergleich zeigt in den meisten Fällen durchaus charakteristische Unterschiede der Generationen, wie auch der verschiedenen teilweise sehr weit voneinander entfernten Populationen.

SUMMARY

The analysis discussed concerns normal variability of certain wing proportions of the two generations of the Segelfalter Swallowtail (*Iphiclides podalirius* L.) in comparison with each other. Differences between generations and geographic races have generally been described by lepidopterists by words, which permit different interpretations even by lepidopterists who know the species well. In the present paper an attempt was made to discover objective data on

the named characteristics in open-country series of a population from the Main-valley northwest of Wurzburg, Germany, in 1947-1951. Comparisons of some open-country series from other places were available. By connection of certain measure-points on the wings, measure units resulted, which allow the calculation of comparable relative data. This comparison shows in most cases absolutely characteristic differences in the generations, also in the different populations, some quite far distant from each other.

Zoologische Institut der Universität, Würzburg, Germany

DISCUSSION OF PROF. WOHLFAHRT'S PAPER

Prof. M. HERING, Berlin, remarks that: "Bei der grossen Flugtüchtigkeit der Art halte ich es für möglich, dass successive Einflüge von Faltern von benachbarten Subspecies, in verschiedenen Jahren verschieden stark, erfolgen und die Resultate verfälschen."

Prof. LORKOVIC, Zagreb, says: "Die Untersuchungen WOHLFAHRTS sind zu Begrüssen, da es endlich Zeit ist subjektives Betrachten aus der Systematik entfernen und mit objekiven Messmethoden zu arbeiten."

Prof. HERING remarks also: "Im Hinblick auf die vom Vortragenden verwendete Bezeichnung "Rasse" muss dringend darauf hingewiesen werden, dass nach vielen Bemühungen die Nomenklatur-Kommission für die Kategorie unterhalb der Species die internationale Bezeichnung "Subspecies" als verbindlich geschaffen hat. Die Verwendung von "Rasse" schafft nur Verwirrung, denn: Priorität hat die Haustirrasse für diese Bezeichnung. Der Beginn dieser Verwirrung geht auf den Gebrauch bei RENSCH zurück, der das zuerst von KLEINSCHMIDT in seiner "Formenkreis-Lehre" gebrachte bedankengut übernahm und nur "Formenkreis" durch "Rassenkreis" ersetzte. Unglücklicherweise hat der Terminus Rasse eine gewisse Verbreitung gefunden, und es muss davor gewarnt werden, durch seine Verbreitung die mühevolle Arbeit der Nomenklatur-Kommission auf dem Gebiete der Schaffung international einheitlicher Termini zur zerstören."

SUMMARY OF THE PROCEEDINGS OF THE SPECIAL MEETING OF THE LEPIDOPTERISTS' SOCIETY IN CONJUNCTION WITH THE IXTH INTERNATIONAL CONGRESS OF ENTOMOLOGY

The meeting was held August 21, 1951, in the Little Auditorium of the Congress Building (het Koninklijk Instituut voor de Tropen), in Amsterdam, the Netherlands. In spite of the heavily burdened program of the Congress, a free evening, an auditorium, opportunity and operator for projection, and last not least, a varied assembly of lepidopterists and guests were secured, to make the meeting a success.

The following numbers show that the Lepidopterists' Society fully succeeded in its intention: using the splendid opportunity of the IXth International Congress of Entomology to bring together as many members and others interested in lepidopterology from different countries as possible. Of the 41 attending the meeting[1] 18 were members of the Lepidopterists' Society, 39 were members of the Congress, 12 were members of the Nederlandsche Entomologische Vereeniging. Altogether the following thirteen different countries were represented: Belgium (3), Belgian Congo (1), Danmark (1), England (3), Finland (1), France (2), Germany (8), Japan (2), Mauritius (1), Netherlands (13), Spain (1), U. S. A. (4), Yugoslavia (1).

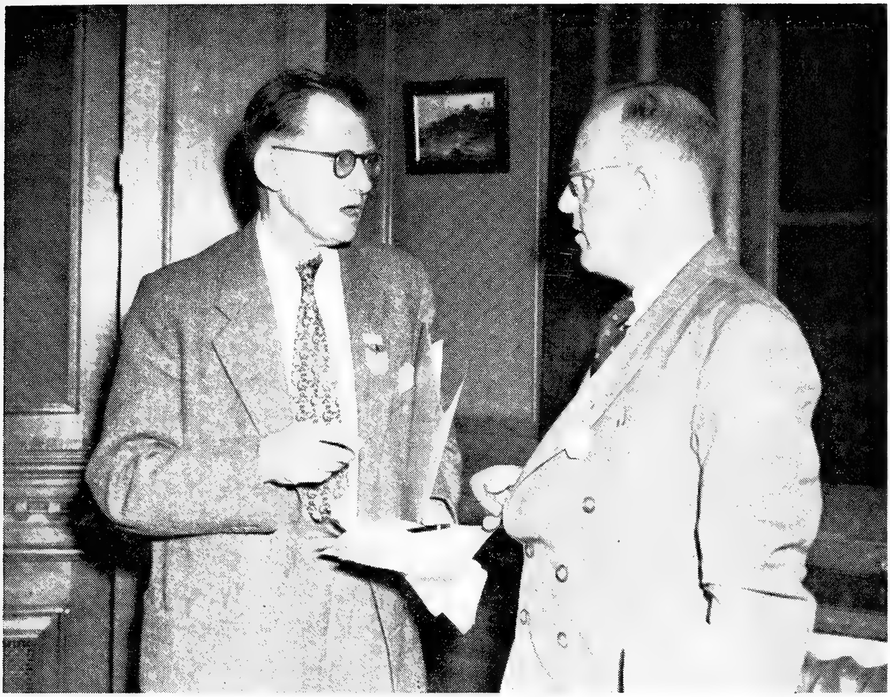
At 8 o'clock p.m. the Vice President of the Lepidopterists' Society and President of the meeting, Dr. W. FORSTER (Munich, Germany), called the meeting to order, and addressed it as follows:

In Vertretung des Präsidenten der Lepidopterists' Society, des Herrn Professor McDunnough in Halifax, Kanada, habe ich die hohe Ehre und die Freude, Sie hier bei der ersten Versammlung der Lepidopterists' Society auf dem Boden Europas begrüssen zu dürfen. Herr Prof. McDunnough lässt durch mich der Versammlung seine besten Grüsse und Wünsche übermitteln.

Die Tatsache des Zustandekommens dieser Versammlung verdanken wir einer Anregung von Herrn Prof. Charles Remington und dem überaus liebenswürdigen Entgegenkommen der Leitung des 9.Entomologen Kongresses, Herrn Professor Kuenen, dem Präsidenten des Kongresses und dem geschäftsführenden Sekretär, Herrn Dr. de Wilde sei deshalb hier für alle Hilfe und Unterstützung bestens gedankt. Nicht vergessen sei aber auch das Organisationskommitee dieser Veranstaltung, dessen Arbeit heute ihre Früchte trägt. Den Herren Prof. Roepke, Dr. Diakonoff und Herrn Lempke gilt deshalb mein besonderer Dank.

Wie schon erwähnt, ist dies das erste Auftreten der ja noch jungen Lepidopterists' Society in der alten Welt und empfinde es deshalb als ganz besonders erfreulich, dass sich hier eine so stattliche Anzahl von Lepidopterologen aus zahlreichen Ländern zusammengefunden hat, um Probleme unseres engeren Fachgebietes sich anzuhören und zu diskutieren. Gerade nach den schlimmen Zeiten, die hinter uns liegen, ist es doppelt erfreulich zu sehen, dass ein echtes Bedürfnis vorhanden zu sein scheint wieder wirklich international zusammenzuarbeiten. Und wer wäre dazu nicht berufener als die Biologen aller Zweige, da doch, um bei unserem engeren Gebiete zu bleiben, die Lepidopteren und die an ihnen zu erforschenden Probleme nicht an Lan-

[1]. Lady guests did not sign on our list of attendance, and are therefore not included in this number.



Dr. A. DIAKONOFF, Leiden, Netherlands, and Dr. WALTER FORSTER, München, Germany, are shown discussing the meeting of the Lepidopterists' Society, at the IXth International Congress of Entomology in Amsterdam. (Photog. K. Wilson.)

desgrenzen gebunden sind und gerade die hier auftretenden Probleme, seien es solche der Systematik, der Oekologie oder sonstige, nur in grossem Zusammenhang und in Zusammenarbeit über die Landesgrenzen hinweg mit Erfolg bearbeitet werden können. Es sei nur an die Wanderfalterforschung erinnert, die in letzter Zeit sehr erfolgversprechend auf internationaler Basis anzulaufen beginnt.

Um die Zeit für die vorgesehenen Vorträge und die hoffentlich recht rege Diskussion möglichst auszunutzen, werde ich mich kurz fassen. Herr Dr. Diakonoff wird zwei Schreiben zirkulieren lassen, das eine an Herrn Prof. McDunnough, das andere an Herrn Prof. Remington. Nachden zu unserem Bedauern beide Herren an unserer heutigen Veranstaltung nicht teilnehmen können, ist es wohl sicherlich in Ihrer aller Sinne, wenn wir ihnen gemeinsame Grüsse übermitteln (applause). Ich bitte deshalb, die beiden Schreiben zu unterzeichnen.

Ich hoffe nun, dass der heutige Abend für die Teilnehmer recht anregend verlaufe und sich für die Lepidopterists' Society zu einem Erfolg gestalte, auf Grund dessen wir nun auch in Europa zahlreiche neue Freunde gewinnen mögen. Es wäre dies ein weiterer Schritt auf dem Wege zur Schaffung einer leistungsfähigen Organisation der Lepidopterologen der Welt.

Upon this the Secretary forwarded to the meeting greetings of Dr. C. L. REMINGTON, the Editor-in-Chief of *The Lepidopterists' News,* received by him that morning.

GROUP PHOTOGRAPH OF SPECIAL MEETING IN AMSTERDAM

REAR (left to right): AGENJO, Mrs. SHOUMATOFF, (unident), EISNER, VAN REGTEREN ALTENA, LOOF, JANSE, GILLARD, LEMPKE, DOS PASSOS, SHOUMATOFF, DIAKONOFF, VIETTE, HACKMAN, VINSON, Mrs. WOHLFAHRT, WOHLFAHRT, VAN BRUGGEN.

FRONT: YAGI, KUWAYAMA, Mrs. LORKOVIC, LORKOVIC, CHRISTENSEN, HERING, FORSTER, KIRIAKOFF, WILTSHIRE (in rear), HÖNE, STEMPFFER, Mrs. STEMPFFER, LEMS, HINTON, SEYDEL (dark coat).

NOT SHOWN: BENTINCK, DEN BOER, DETHIER, DOETS, GHESQUIÈRE, GRÜNWALDT, HESSELBARTH, KAIJADOE, STAMMESHAUS, WARNECKE, WILLIAMS, WILSON (photographer).

After this the Symposium on the Phylogeny and Classification of the Lepidoptera was called to order. The three papers are being published in the *News* with the discussions which followed.

Between the second and the third paper a short interval was held, dedicated to tea and animated discussions. After this Mr. KENT H. WILSON (Moscow, Idaho, U. S. A.) made several photographs of the meeting, a choice of which is presented here. The Secretary wishes to thank Mr. WILSON also at this place for this unexpected, but most appreciated, contribution to the Proceedings of the meeting.

After a word of thanks by the President the meeting was closed at 10.15 p.m.

A. DIAKONOFF, Secretary

MEMBERS AND GUESTS PRESENT AT THE SPECIAL MEETING

W. FORSTER, München, Germany
B. J. LEMPKE, Amsterdam, Netherlands
E. M. HERING, Berlin, Germany
TH. A. WOHLFAHRT, Würzburg, Germany
E. P. WILTSHIRE, England
A. DIAKONOFF, Leiden, Netherlands
Z. Z. LORKOVIC, Zagreb, Yugoslavia
K. LEMS, Leidschendam, Netherlands
R. W. GRÜNWALDT, München, Germany
C. B. WILLIAMS, Harpenden, England
A. GILLARD, Ghent, Belgium
P. HOLST CHRISTENSEN, Denmark
N. YAGI, Japan
SATORU KUWAYAMA, Sapporo, Japan
N. SHOUMATOFF, New York, U. S. A.
KENT H. WILSON, Idaho, U. S. A.
J. C. EISNER, The Hague, Netherlands
P. A. A. LOOF, Amsterdam, Netherlands
B. GHESQUIÈRE, Brussels, Belgium
H. STEMPFFER, Paris, France
R. AGENJO, Madrid, Spain
J. VINSON, Mauritius
P. E. L. VIETTE, Paris, France
G. WARNECKE, Hamburg, Germany
EBERHARD JÄCKH, Bremen, Germany
GERHARD HESSELBARTH, Diepholz, Germany
G. A. BENTINCK, Amerongen, Netherlands
J. A. JANSE, Hillegom, Netherlands
C. O. VAN REGTEREN ALTENA, Oegstgeest, Netherlands
I. A. KAIJADOE, Oegstgeest, Netherlands
P. J. DEN BOER, The Hague, Netherlands
A. C. VAN BRUGGEN, Leiden, Netherlands
CYRIL DOS PASSOS, U. S. A.
V. G. DETHIER, U. S. A.
C. DOETS, Hilversum, Netherlands
W. HACKMAN, Helsingfors, Finland
H. E. HINTON, Bristol, England
H. HÖNE, Germany
CH. SEYDEL, Belgian Congo
H. J. L. T. STAMMESHAUS, Amsterdam, Netherlands
S. G. KIRIAKOFF, Ghent, Belgium

THE USE OF BAIT TO ATTRACT BUTTERFLIES

by RALPH L. CHERMOCK

A question was presented in a recent issue of the *Lepidopterist's News* (vol. 5: p. 16) concerning the use of bait to attract butterflies. Since many rhopalocerists have neglected this method of collecting, it was felt that some notes on the experiences I have had might be of interest.

Almost any sugaring mixture which will attract moths is equally attractive to many species of butterflies. However, a mixture of mashed rotten bananas and canned crushed pineapple, to which are added sugar and beer, has produced best results. This is left to ferment for a day before using.

A sugaring trail should be selected in an area where the desired species of butterflies occur. A patch of bark, about eight inches in diameter and approximately shoulder high on the trunk of a fairly large tree, is painted with the mixture. A cheap paintbrush is most practical for this purpose. Because of the higher evaporation rate during the daytime, it may be necessary to repaint the trees at regular intervals. The trunk should be free of limbs or nearby branches so that an insect net can be swung freely. The butterflies which are attracted to the bait rarely become inebriated to the extent that they can be collected directly into a cyanide bottle. Therefore, it is almost always necessary to catch them in a net.

The baited trees should be visited frequently, with a minimum of noise or quick movements, as butterflies are easily frightened. A little practice and observation will soon enable the collector to catch specimens. It will be noted that many butterflies are attracted only at certain times of the day. Also, the method of jumping off the tree varies with each species so that some may drop earthward and consequently require an upswing of the net, while others jump directly off in a horizontal direction and require a side sweep.

The advantages of baiting are: 1) it tends to concentrate the specimens for collecting; 2) it attracts many woodland species to a place where they can be more easily collected; and 3) high flying forms, rapidly flying forms, or extremely wary species can be more easily collected. On good collecting days, I have caught as many as 300 specimens of assorted species of *Nymphalis, Polygonia, Limenitis,* and *Asterocampa* in a single afternoon. These forms are usually among the more difficult butterflies to collect in series.

All of the species which have been attracted to this bait belong to the Nymphalididae and Satyridae; no members of the other families have been observed on the sugaring mixtures. The following butterflies have been collected.

Lethe p. portlandia Fab., *L. p. anthedon* Clark, *L. creola* Skin., *L. e. eurydice* Joh. and *appalachia* R. Cherm. are all attracted to sugaring mixtures. They usually sit head downward and are often easily frightened. The best time of the day to collect members of this genus seems to extend from late afternoon to dusk.

Euptychia cymela Cram. and *E. hermes sosybia* Fab. are attracted to sugaring mixtures, but only sparingly. *E. gemma* Hbn. rarely will sit on trees, but often will alight near the ground where the drops of the sugaring mixture have fallen. These species may be attracted during any time of the day, but seem to prefer late afternoon.

Minois a. alope Fab., *M. a. nephele* Kirby, and *M. a. carolina* Ch. & Ch. will often be attracted to drops of the mixture which fall to the ground; more rarely they will sit on the tree trunk. They seem to be most frequent in the morning or towards evening, although occasional specimens will be found during the afternoon.

Limenitis a. arthemis Drury and *L. a. astyanax* Fab. are readily attracted to sugaring mixtures throughout the day and are very easily collected. However, I have seen only one specimen of *L. archippus* Cram. sitting on the bait, although the species has been relatively common in many areas collected.

Nymphalis j-album Bdv. & Lec. and *N. antiopa* L. are commonly attracted to this bait and, though wary, can be collected with relative ease. They seem to fly at almost any time during the day. The same is true of *Vanessa atalanta* L., although the other species of this genus are not normally attracted.

The use of sugaring mixtures provides an excellent method for collecting members of the genus *Polygonia.* All of the eastern species will come to bait at almost any time during the day. Although they are extremely wary, a little practice soon provides the collector with a fine series.

Asterocampa c. clyton Bdv. & Lec., *A. c. flora* Edw., *A. c. louisa* Stall. & Turn., *A. leilia cocles* Lint., *A. c. celtis* Bdv. & Lec. and *A. c. antonio* Edw. are easily collected by using sugaring mixtures. They usually sit head downwards on the tree and require a quick upswing of the net. They are equally abundant at almost any time during the day.

Eunica tatila tatilista Kaye and *Myscelia ethusa* Bdv. are readily attracted to bait on trees in jungle hammocks at almost any time during the day. They are extremely wary, and the trees must be approached cautiously in order to avoid disturbing them. Since they sit head downwards, they require a rapid upsweep of the net.

Anaea a. andria Scud. and *A. aidea floridalis* Johns. & Comst. are frequently attracted to bait, but are usually extremely difficult to approach and collect.

In addition to sugaring mixtures, a few other possible baits should be experimented with. Decaying fruit such as pears, apples, and watermelon have been seen to attract butterflies. If these are placed systematically, they provide additional sources for specimens.

Feces on the ground have also been observed to attract many butterflies. In fact, I have collected a large series of *Speyeria diana* Cram. around the dung of deer in the middle of a road. It also seems to attract *Papilio philenor* L., *Phyciodes tharos* Dru., *Eurema nicippe* Cram., and *Erynnis martialis* Scud. Manure piles also attract these same species.

The use of sugaring mixtures and other possible baits afford an additional technique in collecting butterflies. It is hoped that it will be used more extensively, particularly in the West, where it might be effective in attracting certain groups which are needed in series for systematic work. Also, experimentation with various baits is a form of research which both the amateur and professional can do, and contributes to the knowledge of the feeding habits of butterflies.

University of Alabama, University, Ala., U. S. A.

A NEW ALTITUDINAL HIGH FOR *ERORA LAETA*

by SIDNEY A. HESSEL

On August 11, 1951, as a member of a collecting party on Mt. Washington, N. H., including also C. L. Remington, G. W. Rawson and our host D. J. Lennox, the writer through a stroke of extremely good fortune became "initiated into the fraternity". For the benefit of those not familiar with this use of the colloquialism it means simply that he joined the ranks of those select few who have been so lucky as to capture a specimen of the most mysterious and elusive of eastern butterflies, *Erora laeta* (Edw.). Dr. A. B. Klots commented on the capture in a letter: "and in quite conventional fashion, *i. e.,* in the most unlikely place and when least expecting it."

More definitely, the locality was close to the toll road in that area known as Cragway Spring, elev. 4660 feet, definitely above timber line. The date is apparently the latest of record.

When first seen, the butterfly had been flushed from the ground or ground-cover by my approach and appeared to be a Geometer moth (*Carsia paludata boreata* Pack.) as it fluttered with the light breeze and came to rest some fifteen yards away on a slender, bare, upright twig projecting a few inches above the thick, brushy mat that covered most of the immediate area. It was then that its position with wings held together betrayed its butterfly identity, and for that matter, before the net could be clamped over it, its specific determination.

The insect, however, would not fly up into the net even when its resting spot was disturbed but persisted in crawling through the brushy mat, at times being lost to view. It became evident that the rim of the net, held firmly to the ground by my knees, would have to be lifted, a maneuver I contemplated with horror. At least I would summon assistance!—and so let out a yell which soon brought C. L. R. to the scene, though strangely enough, no rescue parties from the valley below. I lifted the edge of the rim while C. L. R., after one or two false starts, was able to work the *E. laeta* into a cyanide tube and place the cork in position. (Luckily for him he did not excite the insect into a flutter as I was prepared to jump onto the rim of the net and would likely have cut his arms off just below the elbows.)

Upon reflection it did occur to us that nearly 400 pounds of *Homo sapiens* pitted against a single *Erora laeta* male probably was not sporting, but it was a strong and heavy bodied male, so much so that only after microscopic examination by Dr. Klots was I satisfied that the abdomen was not loaded with eggs.

8 Woodmere Blvd. South, Woodmere, N. Y., U. S. A.

THE FEMALE OF *LYCAEIDES ARGYROGNOMON SUBLIVENS*

by V. Nabokov

Last summer (1951) I decided to visit Telluride, San Miguel County, Colorado, in order to search for the unknown female of what I had described as *Lycaeides argyrognomon sublivens* in 1949 (*Bull. Mus. Comp. Zool.*, vol. 101: p. 513) on the strength of nine males in the Museum of Comparative Zoology, Harvard, which had been taken in the vicinity of Telluride half a century ago. *L. sublivens* is an isolated southern representative (the only known one south of northwestern Wyoming, southeast of Idaho, and east of California) of the species (the holarctic *argyrognomon* Bergstr.= *idas auct.*) to which *anna* Edw., *scudderi* Edw., *aster* Edw. and six other nearctic subspecies belong. I bungled my family's vacation but got what I wanted.

Owing to rains and floods, especially noticeable in Kansas, most of the drive from New York State to Colorado was entomologically uneventful. When reached at last, Telluride turned out to be a damp, unfrequented but very spectacular cul-de-sac (which a prodigious rainbow straddled every evening) at the end of two converging roads, one from Placerville, the other from Dolores, both atrocious. There is one motel, the optimistic and excellent Valley View Court where I stayed, at 9,000 feet altitude, from the 3rd to the 29th of July, walking up daily to at least 12,000 feet along various more or less steep trails in search of *sublivens*. Once or twice Mr. Homer Reid of Telluride took me up in his jeep. Every morning the sky would be of an impeccable blue at 6 a. m. when I set out. The first innocent cloudlet would scud across at 7:30 a. m. Bigger fellows with darker bellies would start tampering with the sun around 9 a. m., just as I emerged from the shadow of the cliffs and trees onto good hunting grounds. Everything would be cold and gloomy half an hour later. At around 10 a. m. there would come the daily electric storm, in several installments, accompanied by the most irritatingly close lightning I have ever encountered anywhere in the Rockies, not excepting Longs Peak, which is saying a good deal, and followed by cloudy and rainy weather through the rest of the day.

After ten days of this, and despite diligent subsequent exploration, only one sparse colony of *sublivens* was found. On that one spot a few males were emerging on the 15th. Three days later I had the pleasure of discovering the unusual-looking female. Between the 15th and the 28th, a dozen hours of windy but passable collecting weather in all (not counting the hours and hours uselessly spent in mist and rain) yielded only 54 specimens, of which 16 were females. Had I been younger and weighed less, I might have perhaps got another 50, but hardly much more than that, and, possibly, the higher ridges I vainly investigated between 12,000 and 14,000 feet at the end of July, in the *magdalena-snowi-centaureae* zone, might have produced *sublivens* later in the season.

The colony I found was restricted to one very steep slope reaching from about 10,500 to a ridge at 11,000 feet and towering over Tomboy Road between "Social Tunnel" and "Bullion Mine". The slope was densely covered with a fine growth of lupines in flower (*Lupinus parviflorus* Nuttall, which did not occur elsewhere along the trail) and green gentians (the tall turrets of which were assiduously patronized by the Broad-Tailed Hummingbird and the White-

Striped Hawkmoth). This lupine, which in the mountains of Utah is the food-plant of an alpine race of *L. melissa* (*annetta* Edw), proved to be also the host of *L. argyrognomon sublivens.* The larva pupates at its base, and in dull weather a few specimens of both sexes of the imago could be found settled on the lower leaves and stems, the livid tone of the butterflies' undersides nicely matching the tint of the plant.

The female of *sublivens* is of a curiously arctic appearance, completely different from the richly pigmented, regionally sympatric, locoweed and alfalfa-feeding *L. melissa* or from the *melissa*-like females of Wyoming and Idaho *argyrognomon* races, and somewhat resembling *argyrognomon* forms from northwestern Canada and Alaska (see for instance in the above mentioned work, p. 501 and plate 8, fig. 112). It also recalls a certain combination of characters that crops up in *L. melissa annetta.*

Here is a brief description of *L. sublivens* female: Upperside of a rather peculiar, smooth, weak brown, with an olivaceous cast in the living insect; more or less extensively dusted with cinder-blue scales; triangulate greyish blue inner cretules generally present in the hindwing and often accompanied by some bluish or greyish bleaching in the radial cells of the forewing; aurorae reduced: short and dullish in the hindwing, blurred or absent in the forewing, tending to disappear in both wings and almost completely absent in 3 specimens; lunulate pale greyish blue outer cretules very distinct in both wings; underside similar to that of the male.

Deposited: twenty males and ten females in the Cornell University collection, and eighteen males and six females in the Museum of Comparative Zoology, Harvard University.

Dept. of Russian Literature, Cornell University, Ithaca, New York

The KLAGES collection has come to Cornell University through the intermediary of an alumnus. The parts of most interest to a lepidopterist are Erycinidae, Hesperiidae, and Euchromiidae (= Syntomidae, Ctenuchidae, Amatidae) collected by him at Suapure, Venezuela, in 1898 to 1900, including paratypes of many of the species described in the *Proc. U. S. Nat. Mus.,* vol. 29: 531-552; 1906.

W. T. M. FORBES

COMMENTS ON THE EDITORIAL "THE COMPONENTS OF AN ADEQUATE PAPER DESCRIBING A NEW SPECIES"

by A. E. Brower

The writer has read and reread with much interest our editor's recent article setting forth "The Components of an Adequate Paper Describing a New Species" (*Lep. News,* vol. 5: p. 46; 1951). I am glad to see this move to state in definite terms what is desirable in a good description, and I think that much good can come of it if taxonomists will unite in the effort to promulgate a practical set of recommendations. I have some comments on them at their present stage. I do not feel that the Lepidopterists' Society should put its stamp of approval on any set of components without due consideration of the points and their implications.

1. Might be amplified by addition after ". . . . differs from its nearest relative" with **which is found in the same or nearby territory.** In sections of some genera all of this will have little value, as in *Coleophora* and others.

2. The genitalia of Lepidoptera are extremely valuable for taxonomic purposes, but still there are many genera where they are so similar that a figure or description would have little or no value. After two papers, both illustrating and describing the male genitalia of *Diarsia rubifera* (*U. S. N. M. Bull.* 44 and *Journ. N. Y. Ent. Soc.,* vol. 6: p. 101), one might with good reason ask if J. B. Smith did not make matters worse. He was an outstanding worker too. If he had kept his hands off the male genitalia of the species of *Zale* he described, some modern specialist would have a much better chance of finding out to what his names should apply. Is the ordinary general worker on Lepidoptera in a position to make proper slides in many genera? Genitalic preparations for comparative purposes must be prepared in an entirely different manner in different genera. Considerable work on a genus may be an essential prelude to a properly prepared slide of a type though this may not be practical except for a revision. I have repeatedly heard taxonomists say they had to remount slide preparations or that they found the preparation ruined or impractical to use. Genitalia are subject to variation and are more difficult to describe or figure than the adults, and many such in print are of scant value. In some of our larger museums some curators have not been in favor of having slides made, one practical reason being that they are not prepared to look after slides properly. Suppose we consider the genus *Coleophora.* I have many specimens of *Coleophora* I should like to get identified. A master technician, Dr. J. McDunnough, has published comparative notes, fine figures of genitalia, with descriptions, of many species found in this part of America, but if I made slides of my specimens I could not hope to determine positively which of my specimens are referable to his species, and I do not know of anyone who would attempt to do so. We need to consider the value of specific illustrations of lone species or a few species against the value of such illustrations of all of the species of a taxonomic group or a geographic area when admittedly money for such publication is limited. I have never seen in print an account of any important effort to determine how variable genitalia may be, as for instance the amount of variation in the genitalia of all of the offspring of several females of one species. Is the confused medley of descriptions in a section of *Zale* due to variability of the genitalia or to specific distinctness?

3. How much would be gained by illustrating the adults of the *Coleophora* described during the last fifteen years in the many scattered papers?

4. and 5. The "type" should be a **fair representative** of the species population to be described. Many types of species and subspecies are not representative of the population. There is much interest among collectors in topotypical material, and so there is the suggestion to limit type material to a comparatively small area, apparently on the assumption that typical material may always be secured from that area, but is this necessarily true? Seasons may vary greatly and local environments are often transitory. Any ecologist knows that all vegetation and its associated animal life is transitory, and part of the geographical features are more slowly transitory. I can remember on the Ozark plateau dry seasons when the small, pale form of *Junonia* (*Precis*) *coenia* was usually found, but wet seasons occurred when the large deeply colored form was abundant. One summer the drouth became so intense the papaws shed their leaves. With September rains a partial new crop of leaves was formed and *Papilio marcellus* emerged in numbers to deposit eggs, but Jack Frost cut things short, and dwarfed adults resulted from that population. I believe that these could have been shown to be significantly different in size at least by the use of statistics. When I came to Augusta I found a mowing field and adjacent pasture where I took a nice lot of *Lycaena hypophlaeas* ab. fasciata. Expecting to get another series, I gave an interested collector many of them, but I have not been able to do so. The mowing field was plowed up, but the pasture remained untouched; however *fasciata* seemed to become much scarcer relatively in this population. I remember Walter Clayton of Lincoln, Maine, lamenting the disappearance of the colony of *Euphydryas phaeton,* containing many *superba* and other aberrations, which was found in a small area near his home. Probably the Turtle-head still grows there and at times is populated by the ordinary form of the species, which presumably has a somewhat different genetic makeup. What has occurred on my best Augusta collecting area seems very significant. Road maintenance crews have apparently successfully maintained the *status quo* in this half-mile of roadside, and the butterflies discussed were taken on the very same patches of milkweed. During the last twelve seasons, nine seasons have produced so far as observed merely the expected variation in the population of *Argynnis* (= *Speyeria*) *cybele* (Fab.) (specimens which may be labelled *novascotiae* McD. regularly occur), but in 1939 and 1940 a large number of heavily marked more or less melanic specimens occurred and in 1951 three striking specimens of one variation were secured having three conspicuous silver rays on the underside of the hind wing from the base to near the middle of the wing (like *A. cypris mayae*). This number in about three trips indicates a fair percentage of the population was of this variation, as the species occurred in moderate numbers. In twenty-two seasons of collecting in Maine I have never seen this conspicuous variation before. If in the Western States a collector had taken a series of these in 1939 and 1940, another collector a series from 1941 to 1950, and third collector a series in 1951, all on the same flowers in a local area, could not three names readily follow? If some favorably located collector in the West would collect in the same flower patches a representative yearly sample for 25 to 50 years of *Argynnis, Melitaea,* or other similar group, how great a variation could we expect in some of the species? Yes, type localities may change greatly for an insect and over far greater distances than fifty miles. I have just been tramping an area, difficult of access except on foot, hunting deer. Evidence of transition is abundant in many house

sites and miles of stone walls, where the primeval climax forest disappeared before the axe and the plow and the stone walls arose around the tilled fields, only to revert through successions until to-day the lumberman is harvesting a crop of large white pine and hardwood sawlogs from those fields. As I gazed upon an eleven inch birch growing between the nicely built walls of a basement, walls of what must have been a fine home in its day, I reflected that not even the deer could exist in the primeval forest. With so many changes can we be sure that the type localities where our early butterfly types were collected will yield comparable material? Have new areas been colonized by our butterflies by extension from the edge of their range or has this come from a boiling-over from an area where population pressure was much greater?

6. The implication in this is that the private collector is frowned upon for keeping his types, and I agree with Dr. Remington as to its truth, but it would be interesting to know what per cent of those who "frown" are on museum staffs and actually retain control of their types often in their private collection merely stored in the museum. Is the Lepidopterists' Society to consider "frowning" on the practice of the individual collectors retaining types, without anything being said on the other side? One can hear the statement, "museum doors open in". Unquestionably collectors should be encouraged to place their types in the larger museums, and if *The Lepidopterists' News* carried an informative article on the policies and practices of museums and their staffs and what they do for the field and private collector and the advancement of our science more collectors would give this thought. I have spent many pleasant and profitable days in the museums of America and feel I have some good friends on their taxonomic staffs, but I have sometimes found collectors hesitant to turn to museums. Are museum taxonomists too jealous of anyone else describing new species? Do they devote too much of their time to miscellaneous descriptions and small papers which would be practical for the private worker to the neglect of much needed monographic and revisionary papers? We haven't had a passable catalogue of our Lepidoptera since Dyar's and even that lacks much information which is sorely needed in a catalogue. Suppose we "frown" upon the private collector keeping his types and he passes them on to some of the largest museums, then when he finds something more which he thinks may be new or important how much help can he reasonably expect to receive from these same institutions?

Important as all of the points set forth are — viewed in their entirety — every one of them may be satisfied by arm-chair entomology using a single specimen in any degree of condition, except the discussion under No. 6. Oh how many descriptions would read differently if the describer had waited until he had before him a series, including both sexes! (Many would never have been published.) To set forth the proposed requirements will require, for most Lepidoptera, two to three pages of technical description and all of great value but haven't some workers like S. B. Clemens set forth in as many sentences or a short paragraph information of as much practical value for the positive determination of the species they had before them? Measured by these standards Miss Braun's paper on *Nepticula* falls far short, but for the practical identification of the species the writer feels it is equally far above some papers which can qualify. Other papers could be readily named. The larva, pupa, and the habits of the larva and adult offer points of fully as great value as those enumerated for specific determination and shouldn't these be included so far

as possible in an adequate description? Many species have been recognized first by differences in larval or adult habits, and can most readily be recognized by such differences; therefore, isn't their description necessary for an adequate description? Perhaps there are no more Edwardses or Scudders among butterfly collectors, but certainly biological work has lagged. The museum worker will as a rule of necessity deal with the lifeless remains — whatever the field worker has preserved — but for the majority of the members of the Lepidopterists' Society doesn't the living animate insect offer unique opportunities for contributions toward our knowledge of the Lepidoptera?

5 Hospital Street, Augusta, Maine

FUNDS NEEDED FOR ILLUSTRATIONS

The Lepidopterists' News is now printed by a process and on a paper which permits perfect reproduction of photographs and other half-tone figures (see Prof. Wohlfahrt's *Iphiclides podalirius,* Abb. 2, on page 16). While not unduly costly, such figures are expensive enough so that half-tones must be kept at a minimum unless special arrangements can be made to provide funds. The warm response we have always received, whenever a definite need for funds has been announced, leads me to believe that there are probably one or more members of the Society who would be interested in establishing a specific ILLUSTRATIONS FUND. Correspondence on this possibility will be welcomed.

C. L. Remington

ANNUAL SEASON SUMMARY

The Associate Editor in charge of the annual Season Summary, Dr. E. G. Munroe, is re-examining the policy for the Summary, in cooperation with the eight Area Summarizers. All members of the Society concerned with the Summary are invited to send their views to him. His address is: Dept. of Entomology, Science Service, Ottawa, Canada.

ON SOME INACCURACIES IN KLOTS' *FIELD GUIDE*

by V. NABOKOV

In connection with "Blues", I wish to correct two or three slips in Professor Alexander B. Klots' important and delightful book (*A Field Guide to the Butterflies of North America, East of the Great Plains*).

On p. 166 there is a misprint: "Center (formerly Karner)" should be, of course, "Karner (formerly Center)". Incidentally I visit the place every time I happen to drive (as I do yearly in early June) from Ithaca to Boston and can report that, despite local picnickers and the hideous garbage they leave, the lupines and *Lycaeides samuelis* Nab. are still doing as fine under those old gnarled pines along the railroad as they did ninety years ago.

In p. 165, another, more unfortunate transposition occurs: "When fawn colored, more vivid in tone" should refer not to *Lycaeides argyrognomon* but to *L. melissa,* while "wings beneath, when fawn colored, duller in tone" should refer not to *L. melissa* but to *L. argyrognomon* (see my "Nearctic Lycaeides", *Bull. Mus. Comp. Zool.,* vol. 101: p. 541; 1949).

On pp. 162-164, the genus *Brephidium* (in company with two others) is incorrectly placed between *Hemiargus and Lycaeides.* I have shown in my paper on Neotropical Plebejinae (*Psyche*, vol. 52: pp. 1-61; 1945) that *Hemiargus (sensu lato)* and *Lycaeides* belong to the same group (subfamily Plebejinae—or supergenus *Plebejus;* the rank does not matter but the relationship does). *Brephidium,* of course, stands on the very outskirts of the family, in a highly specialized group, immeasurably further removed from *Hemiargus* or *Lycaeides* than, say, *Lycaena.* This is where my subfamilies come in handy since at least they keep related things in one bunch and eject intruders. Views may differ in regard to the hierarchic element in the classification I adopt, but no one has questioned so far the fact of the structural relationship and phylogenetic circumstances I mean it to reflect. The whole interest of *Hemiargus* is that it is allied to *Lycaeides* etc. while bearing a striking superficial resemblance to an African group with which it does not have the slightest structural affinity. Systematics, I think, should bring out such points and not keep them blurred in the haze of tradition. I am perfectly willing to demote the whole of my "subfamily" Plebejinae to a supergenus or genus *Plebejus* (*Plebejus ceraunus, isola, thomasi, argyrognomon, melissa, aquilo, saepiolus,* etc.) but only under the condition that it include exactly the same species, in the same groupings ("subgenera" or numbered sections, as you will) and in the same sequence of groups, without intrusions from groups assigned structurally to other "subfamilies" (and then, of course, *lygdamus, battoides,* and *piasus* should be all in *Scolitantides* or its equivalent). However, I still think that the formality of generic names for the groupings is a better method than going by numbers, etc. Names are also easier to handle in works on zoological distribution when it is important to bring out the way a group is represented in different regions of the world. Generally speaking, systematics is not directly concerned with the convenience of collectors in their dealings with small local faunas. It should attempt to express structural affinities and divergences, suggest certain phylogenetic lines, relate local developments to global ones—and help lumpers to sort out properly the ingredients of their lumps.

Dept. of Russian Literature, Cornell University, Ithaca, New York

FIELD AND TECHNIQUE NOTES

ANTHOCARIS IN MISSISSIPPI

The note by Dr. Rawson, "Hilltops and *Anthocaris*" (*Lep. News,* vol. 5: p. 70), regarding his observations in New York, supplemented by the Editor's note regarding his experience in Connecticut, suggest that the following observations from Mississippi may be worthy of record. I have been collecting in eastern Hinds County, Mississippi, a few miles west of the city of Jackson, for the past six years. This collecting has yielded 19 specimens of *Anthocaris midea* (Hbn.): 18 males and one female. Dates and numbers taken are as follows: males: 6 April 47, 17 April 49, 18 March 50 (3), 3 March 51 (2), 10 March 51, 25 March 51 (4), 29 March 52, 31 March 51, 1 April 51 (2), 7 April 52 (2); female: 17 April 49.

These individuals showed no preference for hilltops; indeed if any topographic preferences were indicated they were for low places. I find it difficult to explain the series of 10 males taken throughout a 30-day period in 1951 as simply indicating the beginning of the brood. I would be inclined to believe that the 1951 crop of *A. midea* in this locality consisted predominantly of males as a result of biologic rather than topographic, ecologic, or time of observation factors. The winter and spring broods of *Colias eurytheme* (Bdv.), which regularly appear in this locality in large numbers, invariably have a very large proportion of males to females.

BRYANT MATHER, P.O. Drawer 2131, Jackson, Mississippi

THE FIRST RECORD OF A BUTTERFLY MIGRATION IN AMERICA

In "The History of the Discovery of America by Christopher Columbus; written by his son Don Ferdinand Columbus" (Kerr . . . Voyages and Travels, vol. 3, 1811, p. 120) we read that, on or about June 11, 1494, during Columbus's second voyage, "Bearing up closer to Cuba, they saw turtles of vast bigness, and in such numbers that they covered the sea. At break of day they saw such an enormous flock of sea crows as even darkened the sun, these were going from sea towards to the island, where they all alighted; besides these abundance of pigeons and other birds were seen; and the next day such immense swarms of butterflies, as even to darken the air, which lasted till night, when a heavy rain carried them all away."

Herrera gives the same account, evidently copied from Don Ferdinand Columbus's manuscript.

AUSTIN H. CLARK, U. S. National Museum, Washington, D. C.

PORTHESIA FEIGNING DEATH

On page 46 of the *Lep. News,* vol. 4, Edward G. Voss relates his experience with *Catocala* feigning death; he says he never observed it before among moths. In Europe a striking instance of this rather ineffective behaviour ("ineffective" of course to human predators) is the feigning of the common lymantriid *Porthesia similis* Fuessl. When caught in the net or taken from the leaf or stem to which it was clinging this small but conspicuous white moth never fails to fold **down** its wings and to stretch upward the abdominal segments, which bear a mass of yellow hairs. It will remain thus for a considerable time, and when no attention is paid it suddenly comes to life again and may escape. The reaction is a very prompt one; I never saw a specimen trying to get away instantly, but it always fell down in a very deceiving manner. Some other species are said to do the same, particularly Notodontidae (*Lophopteryx*).

KEES LEMS, 38 Kon. Wilhelminalaan, Leidschendam, Netherlands

REMARKABLE OBSERVATIONS BY YOUNG JAPANESE LEPIDOPTERISTS

As a result of the transition of general interests from mere collecting to life-history observation, there have been many excellent reports by younger Japanese butterfly hobbyists. I will introduce herewith some of their remarkable observations.

1) FOUR CONSECUTIVE GENERATIONS OF *POLYGONIA C-AUREUM* REARED BY THE AID OF THE RICHARD TECHNIQUE.

Ikuo Hayano, a medical student in Yokohama, applied the Richard Technique (*Lep. News,* vol. 2: p. 74) to the securing of eggs of *P. c-aureum* (Linné) in July 1950 and got the second generation in August, the 3rd in September, and the 4th in November. The November adults are now hibernating in a cage and probably will produce spring broods. Among many notable results obtained, the most interesting is that the wing patterns of the broods are not uniform. "*Forma aest.*" occurs side by side with "*forma autumn*". This reminds us of Frohawk's observation in form *hutchinsoni* of *P. c-album* and de Nicéville's experiment on forms of *Melanitis leda.* Mr. Hayano is trying to find the elements which affect the wing patterns and the biological differences, if any, such as in mating or hibernating.

2) POSITION OF ANTENNAE IN HIBERNATING *EUREMA HECABE* AS AFFECTED BY WEATHER AND TEMPERATURE.

Masayuki Takeda, a junior high student in Tochi-gi-ken, observed in the winters of 1948-50 the life of hibernating *E. hecabe* (Linné). Among many valuable observations, the most noteworthy is that the antennae of wintering *hecabe* are exclusively sensitive to weather and temperature. For instance, in December the position of the antennae at night (10-11 p. m.) is affected by weather and temperature at that specific time, while in January the same is affected by weather and highest temperature of preceding day time (10 a. m.-2 p. m.). For example, the antennal position at December nights are as follows:

a) Exposed, parallel with the costal margin of folded wings, if weather is fine and temperature stands at above 8° C.
b) Club-parts only exposed out of folded wings, if fine and between 5°-8° C., cloudy and above 4° C. or rainy and above 5° C.
c) Concealed completely between folded wings in ♀♀ and club-parts half exposed in ♂♂, if fine and below 5° C., cloudy and below 4° C., rainy and below 5° C. or snowy (or with heavy wind) at any degree.

3) DISCOVERY OF TRUE ANT-GUEST LARVA *NYPHANDA FUSCA.*

Fumiaki Nagayama, an assistant of a veterinary laboratory in Tokyo, found the long-sought-for larvae of *N. fusca* Brem. & Grey in July 1948. In co-operation with Takeo Ishizawa and the writer, he succeeded in a complete survey of this fascinating symbiosis of caterpillars and ants. The larvae are fed orally by the host-ants by the latter's disgorging of liquid foods. This feeding habit is only comparable to that of the East African lycaenid *Euliphyra mirifica* Holl. observed by C. O. Farquharson, as far as I know. A detailed account of my notes on *Nyphanda* has been sent to Mr. A. H. Clark in Washington with some figures and photographs. The Australian *Pseudodipsas myrmecophila* and African *Axiocerses harpax* (Fab.) (both lycaenids) have been suspected as excretophagus-myrmecoxenous but not yet confirmed.

TARO IWASE, 345 Komachi Kamakura, Kanagawa-Ken, Japan

A LIVING SIPHON

I wonder if it is a common practice for moths to convert themselves into living siphons, by drawing up water through the maxillary tube and pumping it straight through the body. I watched a moth, later identified as *Venusia cambrica* Cort, perform this stunt while perched head down inside a pail partly filled with water. I watched the insect long enough to assure myself that there was no mistake, as to what it was doing, and it was still going strong when I put a stop to the performance.

RICHARD GUPPY, R. R. I., Marine Drive, Wellington, B. C.

MIGRATION NOTES FROM MEXICO

On 19 August 1948, a migration of *Libytheana bachmanii larvata* (Strecker) was noted along the Pan American Highway between La Gloria and Sabinas Hidalgo, Nuevo Leon, Mexico. All specimens were flying eastward at one to three feet above ground level. The heaviest flight was near Vallecillo, but the migration was plainly evident for fifteen to twenty miles on either side of this point. The flight was apparently limited on the south by the spur of the Sierra Madre Oriental which is just south of Sabinas Hidalgo and on the north by the 45 miles of arid, barren country between La Gloria and Nuevo Laredo. No evidence of migration was noted either in Laredo, Texas, or south of Mamulique Pass, Nuevo Leon, although the species was rather common in both localities.

Along the same route on 9 September 1941, *L. b. larvata* was exceedingly common, some flowering shrubs near Vallecillo being nearly blanketed with specimens, but there was little indication of any migratory tendency.

On 27 September 1951, a migration of *Phoebis agarithe* (Bdv.) was noted on the Pan American Highway between El Mante and Ciudad Victoria, Tamaulipas, Mexico. All specimens were flying southward, most commonly at three to six feet above ground level. There was a very light breeze from somewhat west of south. The flight was so dense near El Mante that both sides of the highway were dotted every few inches with specimens killed by automobiles, although traffic was relatively light. The southern limit of the flight was not determined because the highway was entered from the west at Antiguo Morelos, eighteen miles south of El Mante, and at this point it was quite dense. The migration did not extend appreciably west of the highway, probably because of the range of hills in this direction, nor was there any evidence of migration in the valley just to the west of these hills, although the species was common there. The flight had almost ceased about thirty miles north of El Mante.

It may be noted that this has been an unusually wet year for this region with an attendant luxuriance in vegetation. There was no indication of migration in the same area on 10 September 1951, though the species was common. Rains, which caused all rivers to flood, had occurred in the intervening period.

Both sexes of *P. agarithe* were involved, though the males were the more common. Various other species, small pierids, libytheids, and nymphalids, were noted infrequently in what appeared to be imitative migration, flying steadily and continuing on the main line of flight until out of sight. Their behavior was in contrast to most examples of their respective species which were making the usual short flights in random directions. The *P. agarithe* were not deflected by relatively small obstacles, flying over or through trees and thickets, but they did tend to avoid ridges and to concentrate in the lower passages where these lay along the direction of flight.

E. W. FAGER, Institute of Radiobiology and Biophysics, University of Chicago, Chicago, Illinois

SPECIMENS WHICH DIE WITH WINGS REVERSED

I noticed in the *Lep. News* (vol. 4: p. 73; 1950) an article by Richard Guppy, Wellington, B. C., in which he says in part: "Specimens that turn inside out can be rescued by placing them in a relaxing jar, with very little moisture, for 24 to 48 hours. They will then turn back easily." It occurred to me that the method I use might be of value to those who do not use it. I carry a pair of forceps and a setting needle. When a specimen turns backward I wait till shortly after all movement has ceased and then shake the specimen out of the jar and seize its body from below with the forceps and then insert the needle between the wings and press the wings open. Usually the wings will snap back into the correct position. It has to be done at just the right time to be successful. If tried too soon, the butterfly may partly recover on exposure to the air and flip itself inside out again. If left too long, it begins to get rigid. I usually sit down about once every twenty minutes and turn any specimens that need it.

C. S. QUELCH, Transcona, Manitoba

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. In the first five volumes of the *Lep. News* 1722 papers and books were listed. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members; the many regularly received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [L.G.] - L. A. GOZMANY; [G.dL.] - G. DE LATTIN; [C.R.] - C. L. REMINGTON; [T.S.] - T. SHIRÔZU. **A complete set of these pages, for clipping and filing, may be obtained for Vol. 4 and Vol. 5 and a subscription for Vol. 6 for $ 0.50 per volume.**

A. GENERAL

1. Clark, Austin H. and Leila F., "The butterflies of Virginia." *Smiths. Misc. Coll.,* vol. 116, no. 7: vii + 239 pp., 31 pls. 20 Dec. 1951. Discusses distribution and lists local and seasonal occurrence. Figures and keys to all species. [P.B.]
2. Peterson, Alvah, *Larvae of insects. An introduction to nearctic species. Part I. Lepidoptera and Hymenoptera.* 315 pp., 84 pls. Columbus. 1948. Keys to orders for nymphs, naiads, larvae, pupae; keys to families for larvae of Lepidoptera and Hymenoptera, with summaries of family structure and habits. Extensively illustrated. See review in *Lep. News,* vol. 3, p. 37. [P.B.]
3. Remington, C. L., "The orders of insects." *Lep. News,* vol. 3: pp. 45-47, 1 fig. "Apr-May" [July] 1949.

B. SYSTEMATIC

4. Beirne, Bryan P., "Subspeciation in European Lepidoptera." *Lep. News,* vol. 5: pp. 27-28. 1951.
5. Bernardi, G., "Notes sur la nomenclature des Lycaenidae (Lep. Rhopalocera)" [In French]. *Bull. Soc. Ent. France,* vol. 56: p. 30. Feb. 1951. Proposes *Lysandra pulchella* nom. nov. for *L. pulchra* Sheljuzko (homonym). Notes on subspecific names of three European species. [P.B.]
6. Bernardi, "La détermination des *Maculinea* français" [In French]. *Rev. Franc. Lépid.,* vol. 13: pp. 16-18, 5 figs. "Jan.-Feb." [31 Mar.] 1951. Key to 4 spp. Distributions given. [P.B.]
7. Boursin, Ch., "Eine seit 175 Jahren verkannte europäische *Derthisa*-Art" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 44-51. 30 June 1951. Distinguishes *D. trimacula* and *D. glaucina* and discusses taxonomic history, distribution, and parallel variation of these long-confused spp. [P.B.]
8. Box, Harold E., "New species and records of *Diatraea* Guild. from northern Venezuela." *Bull. Ent. Res.,* vol. 42: pp. 379-398, 1 pl., 5 figs. Aug. 1951. Describes as new: *D. busckella setariae* (Yuma, Carabobo Prov.); *D. andina* (near Cordero, Tachira Prov.); *D. pittieri* (Rancho Grande); *D. silvicola* (Apure); also 2 'forms'. Raises *D. rosa* to specific rank. Figures adults and genitalia of all. Gives food plants and distribution records for 11 spp. [P.B.]
9. Bradley, J. D., "A new species of *Labdia* (Lepidoptera: Cosmopterygidae) from India, hitherto erroneously identified as *Labdia promacha* (Meyrick)." *Ann. Mag. Nat. Hist.,* 12th ser., vol. 4: pp. 510-513, 1 pl. May 1951. Describes as new *L. fletcherella* (Pusa, Bengal). [P.B.]

10. Brown, F. Martin, "Simple statistics for the taxonomist. *Lep. News,* vol. 5: pp. 4-6, 43-45, 64-66, 112-120. 1951.

11. Bryk, Felix, "Über den Habitus der Satyride, *Pararge achine* (Scop.), in Schweden (Lepidoptera)" [In German]. *Ent. Tidskr.,* vol. 72: pp. 29-36, 2 figs. 15 Apr. 1951. Describes as new *P. a. suecica* (Sweden); *P. a. rambringi* (Gotland); also 1 'form'. No type localities. [P.B.]

12. Caruel, Marcel, "Quelle est la forme typique de *P. achine* Scopoli?" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 145-147. "Sept.-Oct. 1949" [25 Jan. 1950].

13 Cary, Margaret M., "Subspeciation among sphingid moths of the West Indies." *Lep. News,* vol. 5: pp. 20-23, 1 fig. 1951.

14. Collenette, C. L., "A new *Redoa* from Celebes (Lep., Lymantriidae)." *Entomologist,* vol. *84:* pp. 17-18, 2 figs. Jan. 1951. Describes as new *R. listrophora;* figures ♂ genitalia of the new sp. and of the related *R. marginalis.* [P.B.]

15. Collenette, C. L., "Some new species of Lymantriidae in the British Museum (Natural History)." *Ann. Mag. Nat. Hist.,* ser. 12, vol. 4: pp. 1026-1040, 1 pl. Oct. 1951. Describes as new: *Leucoma sericea tafa* (Mt. Tafa, Papua); *Redoa crocophala* (mts. south of Wenchow, China); *Kanchia dinawa tafa* (Mt. Tafa, Papua); *K. stibiessa* (New Ireland); *Cispia ochrophaea polygramma* (Khasi Hills, India); *Euproctis catapasta* (Darjeeling, India); *E. stenosacca* (Khasi Hills); *E. walshae* (Samarinda, Borneo); *Parakanchia cyclops* (Sabron, Cyclops Mts., Dutch New Guinea); *Lymantria kanara* (Kanara, India); *Dasychira buinensis* (Buin, Bougainville, Solomon Is.); *Mardara yunnana* (Yunnan). Figures adults. Proposes *Euproctis chlorozona* n. n. for *E. leucozona* Collenette, 15 Oct. 1938 (*nec* Collenette, 3 Oct. 1938). Discusses *Psilochira* and gives key to 5 spp.; *Imaida* a synonym. Other notes on synonymy and distribution. [P.B.]

16. Fletcher, D. S., "*Eupithecia* studies. - I (Lepidoptera: Geometridae)." *Ann. Mag. Nat. Hist., ser. 12,* vol. 4: 1009-1026, 29 figs. Oct. 1951. Describes as new: *E. dohertyi fumata* (Onyanga, Mt. Cameroon); *E. d. fulvata* (Namwamba Valley, Ruwenzori Range, Uganda); *E. fuscata* (Mobuku Valley, Ruwenzori Range, Uganda): *E. personata* (Batsileo, Madagascar); *E. steeleae* (Mann's Quelle, Mt. Cameroon); *E. nigropolata* (Namwamba Valley, Ruwenzori Range, Uganda); *E. salti* (Shiva Plateau, Mt. Kilimanjaro, Tanganyika); *E. edwardsi* (Namwamba Valley, Ruwenzori Range, Uganda); *E. ochrata* (Mt. Sabinio. Kigezi Dist., Uganda); *E. pseudoabbreviata* (Harar, Abyssinia): *E. tabacata* (Kitale, Kenya); E. angulata (Harar, Abyssinia); *E. multispinata* (Onyanga, Mt. Cameroon): *E. cinnamomata* (Orange Free State). Raises *E. dohertyi, nigribasis* and *immensa* to specific rank; synonymizes *E. gonypetes* under *E. tricuspis* and *E. thessa* under E. *brachptera.* Figures ♂ and ♀ genitalia of most. [P.B.]

17. Forster, Walter, "Die Riodiniden der Ausbeuten Dr. Hönes aus China" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 62-66, 2 pls. 30 June 1951. Describes as new: *Polycaena chauchowensis pallidior* (Likiang, Yunnan); *P. lua minor* (Batang, Tibet); *Dodona hoenei* (Likiang, Yunan). Records and comments on 8 other spp. N. spp. and 2 others figured. [P.B.]

18. Klimesch, Josef, "Über zwei neue Arten aus der *Coleophora millefolii* Z.-Gruppe. *Coleophora franzi* spec. nov. und *C. repentis* spec. nov. (Lep., Coleophoridae)" [In German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 33-38, 6 figs. 30 June 1947. Type locality and food plant for both: Gamsgrube, Grossglockner region, on *Gypsophila repens.* Genitalia figured. [P.B.]

19. Klimesch, J., "*Nepticula (Levarchama) ortneri* spec. nov. (Lept., Nepticulidae)" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 66-70, 6 figs. 30 June 1947. Type locality Leopoldsberg, Austria. Figures ♂ genitalia of n. sp. and *N. cryptella.* [P.B.]

20. Klimesch, Josef, "*Stagmatophora alypella* spec. nova (Lep., Momphidae)" [In German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 72-74, 1 pl. 30 June 1947. Food plant *Globularia alypum.* Type locality Bordighera, Italy (?) [P.B.]

21. Klimesch, J., "Zur Kenntnis der Genitalmorphologie einiger *Nepticula*-Arten (Lep., Nepticulidae)" [In German]. *Z. Weiner Ent. Ges.,* vol. 62: pp. 4-9, 7 figs. 15 Apr. 1951. Describes and figures ♂ genitalia of *N. spinosisimae, N. zermattensis, N. doryciniella,* and discusses position of spp. [P.B.]

22. Klimesch, J., "Über Microlepidopteren des Trausteingebietes in Oberösterreich" [In German]. *Z. Weiner Ent. Ges.,* vol. 62: pp. 101-117, 27 figs. 1 Aug. 1951. Describes as new *Phthorimaea diffluella bellidiastri.* Annotated list of about 100 spp., with figures of genitalia and mines of some. [P.B.]

23. Klots, Alexander B., "Holarctic butterfly speciation and subspeciation, especially in North America." *Lep. News,* vol. 5: pp. 24-27, 1 fig. 1951.

24. de Lattin, Gustaf, "Studien über die Gattung *Crambus* F. I. Über *Cr. myellus* Hb. und die ihn nächst verwandten Arten" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 89-101, 1 pl., 7 figs. 1 Aug. 1951 Describes as new: *C. myellus melinellus* (Terlan, S. Tyrol); *C. permutatellus kaisilai* (Vuorikylä, Finland). Discusses morphology, synonymy, and distribution of these spp. and *C. osthelderi;* figures adults and ♂ and ♀ genitalia. [P.B.]

25. Le Charles, L., "Contribution à l'étude des *Zygaena*" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 178-180. "Nov.-Dec. 1949" [26 Apr. 1950]. Describes as new *Z. filipendulae centrogalliae* (Seine-et-Oise); *Z. f. fischeri* (upper Rhine); *Z. f. armoricensis* (Illeet-Vilaine); *Z. f. calxensis* (Peyreleau); *Z. f. altapyrenaica* (Pyrenees); also one melanic 'form'. The proposal of these names, without figures or adequate descriptions and without specification of type specimens or type localities, in a genus as badly overworked as *Zygaena,* is regrettable. [P.B.]

26. Lempke, B. J., "Catalogus der Nederlandsche Macro-lepidoptera X" [In Dutch, English summary and notes]. *Tijdschr. Ent.,* vol. 94: pp. 227-320, 5 figs. 22 Aug. 1951. Contains Geometridae (continued): Larentiinae (finished), Boarmiinae, divided into 5 tribes. [A.D.]

27. Obraztsov, N., "*Pammene (Hemarosia) tomiana* Z. und andere ihr ähnliche Arten (Lepidoptera, Tortricidae)" [In German]. *Tijdschr. Ent.,* vol. 94: pp. 321-326, 2 figs. 22 Aug. 1951. Discusses *P. (H.) obscurana, ravulana,* and *tomiana,* with synonymy and literature, and figures ♂ genitalia of first and last spp. [A.D.]

28. Remington, Charles L., "Geographic subspeciation in the Lepidoptera. I. Introduction: a general outline of subspeciation." *Lep. News,* vol. 5: pp. 17-20, 5 figs. 1951.

29. Remington, C. L., "The components of an adequate paper describing a new species." *Lep. News,* vol. 5: p. 46. 1951.

30. Salmon, J. T., "New species and records of Lepidoptera from Three Kings Islands, New Zealand." *Rec. Auckland Inst. Mus.,* vol. 3: pp. 291-311, 1 pl. 20 Dec. 1948. Describes as new: *Porina unimaculata* (Hepialidae); *Heliostibes bilineata* (Glyphipterygidae); *Lysiphragma argentaria* (Tineidae); *Ctenopseustis obliquana distincta* (Tortricidae); specimens figured. Records 3 other spp. (Pyralidae, Geometridae, Noctuidae). [P.B.]

31. Scholz, Rudolf, "*Hybernia aurantiaria* Esp. subsp. *lariciaria* nov. subsp. (Lepidopt., Geometr.)" [In German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 113-120, 1 pl. 30 June 1947. Separates larch-feeding race as ssp. No type locality. Discusses biology and variation, naming and figuring 15 'forms'. [P.B.]

32. Sieder, Leo, "*Psychidea bombycella* Schiff. und ihre Rassen" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 33-44, 1 pl., 8 figs. 30 June 1951. Describes as new: *P. b. collina, P. b. altimontana, P. b. silvicolella,* all from east Alpine region; distribution listed and mapped, but type localities not specified. Discusses other European ssp. and gives a table for their separation. [P.B.]

33. Stempffer, Henri, "Contribution à l'étude des Lycaenidae du Liberia" [In French]. *Bull. Inst. Franc. Afrique Noir,* vol. 12: pp. 402-407, 3 figs. Apr. 1950. Describes as new *Oboronia liberiana* (Glofaké, Liberia); figures adult and ♂ genitalia. Lists 28 other spp., with Liberian localities and general distribution. [P.B.]

34. Tilden, J. W., "A new subspecies of *Mitoura siva* Edwards." *Bull. So. Cal. Acad. Sci.,* vol. 50: pp. 96-98, 1 pl. "May-Aug. [15 Oct.] 1951. Describes as new *M. s. mansfieldi* (7 mi west of Simmler, San Luis Obispo Co., Calif.) [P.B.]

35. Viette, Pierre E. L., "The Noctuidae Catocalinae from New Caledonia and the New Hebrides (Lepidoptera)." *Pacific Science,* vol. 4: pp. 139-157, 13 figures. Apr. 1950. Key to 9 genera; redescribes the 13 spp., figuring genitalia. [P.B.]

C. MORPHOLOGY

36. Barth, Rudolf, "Die männlichen Duftorgane von *Papilio polystictus* Btlr. und *proneus* Hbn. (Lepidoptera), zugleich ein Beitrag zum feineren Bau der Duftschuppen" [In German]. *Revista Ent.*, vol. 21: pp. 513-535, 16 figs. [30] Dec. 1950. Description of gross and fine structure of the scent organ in the anal fold of ♂♂ of these 2 spp. [P.B.]

37. Bayard, André, "Les characteristiques morphologiques des *Procris* français" [In French]. *Rev. Franc. Lépid.*, vol. 12: pp. 289-317, 34 figs. "Sept.-Oct." 10 [Dec.] 1950. Describes, with good figures, the ♂ and ♀ genitalia of the 11 French spp. ♂ antennae are also figured, and the ranges and known food plants are listed. [P.B.]

38. Berger, L.-A., "Genitalia d'Hemitheinae" [In French]. *Lambillionea,* vol. 49: pp. 86-87, 1 pl. 25 Aug. 1949. Figures ♂ genitalia of 6 Belgian spp. [P.B.]

39. Bourgogne, Jean, "Morphologie externe et appareil genital d'un exemplaire gynandromorphe de *Zygaena achilleae* Esp. (Lepidopteres Zygaenidae)" [In French]. *Bull. Soc. Zool. France,* vol. 74: pp. 67-74, 1 fig. 1949. Description of a bilateral gynandromorph, with ♂ external genitalia and internal organs indeterminate. [P.B.]

40. Bourgogne,J., "L'appareil genital femelle de quelques Hepialidae (Lepidopteres)" [In French]. *Bull. Soc. Zool. France,* vol. 74: pp. 284-291, 1 pl. 1949. Discusses general morphology in the family, and describes and figures ♀ genitalia in 4 spp. [P.B.]

41. Bros de Puechredon, E., "Une nouvelle localité en Suisse de *Caradrina* O. *(Paradrina* Brsn) *Wullschlegeli* Pglr." [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 208-211, 1 pl. "Jan.-Feb." [12 July] 1950. Figures ♂ genitalia of *C. Wullschlegeli* and *C. selini.* [P.B.]

42. Bryk, F., "Geographische und individuelle Variabilität der Sphragisbildungen (Lepidoptera: Parnassiidae)" [In German]. *Ent. Tidskr.,* vol. 71: pp. 230-234, 1 pl. 31 Dec. 1950. Describes and compares sphragis in spp. of *Eukoraimus.* [P.B.]

D. VARIATION AND GENETICS

43. Alessandri, A., "Sur la capture de *Limenitis sibilla* L. forme ind. *nigrina* Weymer" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 172-173, 4 figs. "Nov.-Dec. 1949" [26 Apr. 1950].

44. Bretschneider, R., "Neue Geometriden-Formen in Sachsen" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 21-22. 15 Apr. 1951. Describes and names color mutants of *Pseudoterpna pruinata, Cosymbia purata, Anticollix sparsata.* [P.B.]

45. Bryk, Felix, "Über einen aberrativen Schmetterling mit einem fur eine andersartige Unterfamilie typischen Merkmal (Acraeinae)" [In German]. *Zeits. Lepidopt.,* vol. 1: pp. 41-44, 1 fig. 1 May 1950. Describes and names an aberration of *Actinote erinome* with the cell of the hind wing open. [P.B.]

46. Burmann, Karl, "Neue Formen von *Larentia scripturata* Hb. ssp. *dolomitana* Habich aus Nordtirol (Lepidoptera, Geometridae)" [In German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 60-61, 1 pl. 30 June 1951. Names 2 'forms'; figures variation. [P.B.]

47. Caspari, Ernst, "Pigment formation in the eye of *Ephestia* and its genic determination." *Zoologica,* vol. 35: p. 17. 17 Apr. 1950. Abstract only.

48. Doets, C., "Notes on Lepidoptera, 1949." *Ent. Berichten,* vol. 13: pp. 163-167, 9 figs. 1 Nov. 1950. Collecting notes on Microlepidoptera in Holland. 17 spp. discussed of which 6 are new for the Dutch fauna. Describes and names aberrations of *Crambus paludellus* and *Opostega auritella.* [A.D.]

49. Dufrane, Abel, "A propos d'*Araschnia levana* L." [In French]. *Rev. Franc. Lepid.,* vol. 12: pp. 94-95. "Mar.-Apr." [4 Oct.] 1949. Names 2 aberrations. [P.B.]

E. DISTRIBUTION AND PHENOLOGY

50. Cary, Margaret M., "Distribution of Sphingidae (Lepidoptera: Heterocera) in the Antillean-Caribbean region." *Trans. Amer. Ent. Soc.,* vol. 77: pp. 63-129, 2 figs. 31 Aug. 1951. Discusses sphingid faunas of the West Indies and adjacent continental regions and their probable origins. [P.B.]

51. Christiansson, Gösta, "En för landet ny *Cucullia*-art" [In Swedish]. *Ent. Tidskr.,* vol. 72: pp. 74-75, 1 fig. 15 Apr. 1951. *C. fraudatrix,* new to Sweden.

52. Clark, Austin H., "Butterflies of the Marshall Islands." *Proc. Ent. Soc. Wash.,* vol. 53: pp. 43-44. Feb. 1951. *Precis villida bismarkiana, Hypolimnas bolina jaluita* and *Badamia exclamationis* are the only spp. definitely recorded. [P.B.]

53. Cleu, H., "Rhopalocères des Cévennes" [In French]. *Rev. Franc. Lépid.,* vol. 11: pp. 349-354, 1 pl. Sept. 1948. Notes on *Parnassius apollo, Erebia* spp., *Argynnis amathusia, Araschnia levana.* [P.B.]

54. Cockayne, E. A., "*Diarsia florida* Schmidt (Lep. Agrotinae): a Species New to Britain." *Entomologist,* vol. *83:* pp. 173-174. Aug. 1950.

55. Dufrane, Abel, "Notes lepidopterologiques" [In French]. *Lambillionea,* vol. 50: pp. 46-47. 25 June 1950. Notes on some spp. of Nolinae and of *Hydraecia.* [P.B.]

56. Esaki, Teiso, "A zoogeographical consideration of the insect fauna in the Pacific Islands." *Proc. VIII Int. Ent. Congr.,* pp. 373-379. 1950. Concludes that this area belongs to the Melanesian and Polynesian sub-regions of the Oriental, and not of the Australian, region. [P.B.]

57. Fletcher, T. Bainbrigge, "*Antigastra catalaunalis* in Gloucestershire." *Ent. Rec.* vol. *62:* pp. 88-89. Oct. 1950.

58. Freeman, T. N., "The Arctic Lepidoptera of Baker Lake, North West Territories." *Lep. News,* vol. 2: pp. 63-65, 1 fig. June 1948.

59. Smith, Denis, "Butterflies in Corsica." *Entomologist,* vol. *83:* pp. 207-208. Sept. 1950.

60. Stroud, Clyde P., "A survey of the insects of White Sands National Monument, Tularosa Basin, New Mexico." *Amer. Midl. Nat.,* vol. 44: pp. 659-677, 2 figs. "Nov. 1950" [12 Feb. 1951]. Lists 20 spp. of Lepidoptera. [P.B.]

61. Svensson, Ingvar, "Lepidopterologiska iakttogelser II" [In Swedish,. English summary]. *Ent. Tidskr.,* vol. *71:* pp. 46-54. 28 May 1950. New records for Sweden and its provinces. [P.B.]

62. Swezey, O. H., "*Tinea despecta* Meyrick, a hitherto unrecorded case-moth in Hawaii (Lepidoptera: Tineidae)." *Proc. Hawaiian Ent. Soc.,* vol. 14: pp. 313-314. Mar. 1951. Hawaiian records, notes on early stages. Records 1 parasite. [P.B.]

63. de la Torre y Callejas, Salvador Luis, "A list supplementing Bates' "Butterflies of Cuba"." *Lep. News,* vol. 3: p. 65. "June" [Oct.] 1949.

64. de Toulgoet, H., "Une noctuelle nouvelle pour la faune francaise: *Spodoptera cilium* Gn." [In French]. *Lambillionea,* vol. 49: p. 124. 25 Dec. 1949.

65. Toxopeus, L. J., "Over de Pionier-Fauna van Anak Krakatau, met Enige Bescheuwingen over het Ontstaan van de Krakatau-Fauna" [In Dutch, English summary]. *Chronica Naturae,* vol. *106:* pp. 27-34, 3 figs. Jan. 1950. Notes on the reestablishment of fauna on this volcano which erupted in 1939; a special study of 2 spp. of *Papilio* is included. [P.B.]

66. Toxopeus, L. J., "The geographical principles of species evolution in New Guinea. A Study on Parallelisms in geological and lepidopterological development." *Proc. VIII Int. Ent. Congr.,* pp. 508-522, 7 figs., 3 maps. 1950. Regards the New Guinea fauna as chiefly endemic in origin, with Asiatic components in the western parts. The so-called 'Australian' component is native, and representatives of this fauna in Australia are 'Papuan'; dispersal of species between the two areas was probably mediated by a Pleistocene land bridge on the Merauke-Aru Ridge. New Guinea was probably an archipelago until very recently; combination of originally isolated faunas may account for the present extraordinary diversity. The Snow Mts. in New Guinea are extremely recent geologically and probably still rising; butterflies are very scarce above timberline and not remarkably different from lowland forms, showing not enough time has elapsed to permit development of a characteristic alpine fauna. [P.B.]

F. BIOLOGY

67. MacKay, Margaret R., "Descriptions of larvae of several species of the genus *Zale* (Lepidoptera: Phalaenidae)." *Canad. Ent.*, vol. 83: pp. 245-261, 9 pls. Oct. 1951. Describes larvae of *Z. duplicata largera, helata, undularis, minerea norda,* and *lineosa,* and gives a key to these spp. Figures larvae and adults, and structural details of former. [P.B.]

68. Madsen, Harold F., and Arthur D. Borden, "The Eye-Spotted Bud Moth on Prune in California." *Journ. Econ. Ent.*, vol. 42: pp. 915-920, 2 figs. Dec. 1949. Biology and control of *Spilonota ocellana.* [P.B.]

69. Maran, Josef, "Quelques expériences d'infestation d'insects par le champignon *Cordyceps sphingum* Sacc." [In Czech, French summary]. *Acta Soc. Ent. Cechoslo-veniae,* vol. 45: pp. 113-119. 1 Oct. 1948. Fungus, cultured from *Sphinx pinastri,* will also attack larvae of *S. ligustri* and larvae and adults of *Ephestia kühniella.* [P.B.]

70. Matthes, Ernst, "Der Einfluss der Fortpflanzung auf die Lebensdauer eines Schmetterlings *(Fumea crassiorella)*" [In German]. *Zeits. vergl. Physiol.*, vol. *33:* pp. 1-13, 2 figs. 31 Jan. 1951. Copulation and egg-laying shorten the life of *Fumea* ♀♀. [P.B.]

71. Michelbacher, A. E., W. W. Middlekauff, and Charles Hanson, "Occurrence of a fungus disease in overwintering stages of the Codling Moth." *Journ. Econ. Ent.*, vol. 43: pp. 955-956, 2 figs. Dec. 1950. Fungus near *Beauveria bassiana* on *Carpocapsa pomonella.* [P.B.]

72. Muspratt, Vera Molesworth, "The behaviour of *Colias crocea* at St. Jean-de-Luz in Winter." *Entomologist,* vol. 83: pp. 217-224. Oct. 1950.

73. Nickels, C. B., "Notes on the life history and habits of the Pecan Nursery Case-bearer in Texas." *Journ. Econ. Ent.*, vol. 44: pp. 433-434. June 1951. *Acrobasis caryivorella.*

74. Norman, T., "The early stages of *Lycaenopsis huegeli.*" *Journ. Bombay Nat. Hist. Soc.*, vol. *49:* p. 569. Dec. 1950. Food plant *Prinsepia utilis.* [P.B.]

75. Oldroyd, H., "A giant bombyliid (Diptera) bred from the pupa of a cossid moth." *Proc. R. Ent. Soc. Lond. B.*, vol. 20: pp. 49-50, 6 figs: 15 June 1951: *Oestranthrax goliath,* n. sp.; host not identified.

76. Vasic, Konstantin, "Une contribution à la connaissance des causes du trouble de l'indice sexuel dans le stade critique de *Liparis dispar* L. (Lepidoptera, Liparidae)" [In Jugoslav, French summary]. *Bull. Coll. Forestry Univ. Belgrad,* vol. 1: pp. 311-336, 3 pls., 5 figs. 1950. Discusses stages leading to a gypsy moth outbreak, and factors upsetting sex ratio at peak; tachinid parasites seem to attack ♀ larvae preferably, resulting in excess of adult ♂♂. [P.B.]

77. van der Vecht, J., "Population studies on the coconut leaf moth *Artona catoxantha* Hamps. (Lep., Zyg.)." *Proc. VIII Int. Ent. Congr.*, pp. 702-715, 6 figs: 1950. Results of a 5-year study in Java. *Artona* normally breeds continuously in the rainy season; when it becomes abundant, action of parasites tends to separate generations, producing a situation which is unfavorable to the parasites, since larvae of the right stage are not continually present. Under some conditions (not clearly understood) this happens early in the rainy season and outbreak of *Artona* occurs before dry season reduces population. [P.B.]

78. Warren, B. C. S., "Biological notes on the subspecies *alpica* and *bigenerata* of *Papilio machaon.*" *Entomologist,* vol. 84: pp. 11-16. Jan. 1951.

79. Wene, George P., "Sunflower Moth larva injuring to young citrus." *Journ. Econ. Ent.*, vol. 43: p. 948. Dec. 1950. *Homoeosoma electellum.*

80. Westdal, P. H., "A preliminary report on the biology of *Phalonia hospes* Wlshm. (Lepidoptera: Phaloniidae), a new pest of sunflowers in Manitoba." *80th Ann. Rep. Ent. Soc. Ontario:* pp. 36-38. 1950. Describes all stages and habits. [P.B.]

81. Wilkinson, A. Denby, "Hirudines following tractor and taking moths." *Brit. Birds,* vol. 44: p. 204. 1951. Records 3 swallow spp. feeding on *Plusia gamma* flushed by tractor in England. [C.R.]

82. Williams, C. B., and D. B. Long, "Phase Coloration in Larvae of Lepidoptera." *Nature,* vol. *166:* p. 1035. 16 Dec. 1950. Larvae of *Plusia gamma* reared in crowded conditions develop unusually dark color, a phenomenon similar to that in migratory locusts. [P.B.]

83. Williams, Carroll M., "The metamorphosis of insects." *Scientific American,* vol. *182:* pp. 24-28, 12 figs. Apr. 1950. Popular account, based largely on his own work with the Cecropia silkworm. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

84. Turner, Neely, "Relation between sugar content of corn and infestation and survival of the European corn borer." *Journ. Econ. Ent.,* vol. 44: pp. 307-309, 1 fig. June 1951. *Pyrausta nubilalis.*

85. Vance, A. M., "Some physiological relationships of the female European Corn Borer Moth in controlled environments." *Journ. Econ Ent.,* vol. 42: pp. 474-484, 2 figs. June 1949. Experiments of food requirements and effects of various factors on longevity and fecundity in *Pyrausta nubilalis.* [P.B.]

86. Way, M. J., and B. A. Hopkins, "The influence of photoperiod and temperature on the induction of diapause in *Diataraxea oleracea* L. (Lepidoptera)." *Journ. Exp. Biol.,* vol. *27:* pp. 365-376, 5 figs. Dec. 1950. Both have a direct effect, increase in either tending to prevent diapause. Effective time of action of photoperiod stimulation very limited. [P.B.]

87. de Wilde, J., "An experimental proof of the activity of the alary muscles in insects." *Proc. VIII Int. Ent. Congr.,* pp. 322-328, 8 figs. 1950. Contractions of the alary muscles of the heart, synchronous with the heart beat, were observed and recorded in isolated hearts of a number of Lepidoptera (larvae and adults). Evidently serve as heart dilators. [P.B.]

88. Williams, C. B., and B. P. Singh, "Effect of moonlight on insect activity." *Nature* vol. *167:* p. 853. 26 May 1951. Tests with a mechanical trap not dependent on light showed average catches about five times as great at new moon as at full. The effect of moonlight in reducing night catches is not due merely to reduced efficiency of light traps. [P.B.]

89. Wolfram, Rosemarie, "Über die Histogenese der Excretpigmente bei verschiedenen Rassen von *Ptychopoda seriata* Schrk. und *Ephestia kühniella* Z." [In German]. *Zts. ind. Abst. und Vererbungslehre,* vol. *83:* pp. 254-289, 15 figs. 17 Dec. 1949.

90. Yamafuji, Kazuo, "Existence of an enzyme catalyzing the hydrogenation of oximes in Silkworms." *Nature,* vol. *167:* pp. 770-771. 12 May 1951. Evidence for the possibility that *Bombyx* can use inorganic nitrogen salts as nutrients. [P.B.]

H. MIGRATION

91. Abbott, Charles H., "Twenty-five years of migration of the Painted Lady Butterfly, *Vanessa cardui,* in southern California." *Pan-Pacific Ent.,* vol. 26: pp. 161-172. 29 Dec. 1950. Summary of information on 4 migrations, with a discussion of possible causes. [P.B.]

92. Abbott, Charles Harlan, "A quantitative study of the migration of the Painted Lady Butterfly, *Vanessa cardui.*" *Ecology,* vol. 32: pp. 155-171, 4 figs. Apr. 1951. Analysis of 5 migrations in southern California, covering geography of the area, vegetation types, direction of migration, and influence of weather. No theory seems entirely adequate to explain the migration, though population pressure fits the facts best. [P.B.]

93. Beall, Geoffroy, "A coordinated study on the migration of the Monarch butterfly: a plea for information from local naturalists." *Lep. News,* vol. 5: pp. 37-40, 3 figs. 1951.

94. Brown, F. Martin, "Some notes on *Danaus plexippus* in 1950." *Lep. News,* vol. 4: pp. 45-46. "1950" [Jan. 1951].

95. Burton, J. F., and D. F. Owen, "Further observations on migrant insects in the Thames estuary." *Entomologist,* vol. 84: pp. 160-161. July 1951. Several Lepidoptera mentioned. [P.B.]

96. Bryk, F., "Parallele Zugrichtung bei Schmetterlingen und Vögeln im Stockholmer Scherenhofe" [In German]. *Ent. Tidskr.,* vol. 71: pp. 177-178. 31 Dec. 1950. Reports migrating *Pieris brassicae* and crows following the same course. [P.B.]

97. Buchholz, Otto, "Flight Notes: two *Papilio,* one *Kricogonia.*" *Bull. Brooklyn Ent. Soc.,* vol. 44: p. 72. Apr. 1949. Mass movements, *P. palamedes and P. troilus ilioneus* and *K. lyside.* [P.B.]

98. Dannreuther, T., "Migration records, 1950." *Entomologist,* vol. *84:* pp. 85-90, 102-106. Apr., May 1951. Records of 52 immigrant spp. [P.B.]

99. Darge, Philippe, "Sur une migration de Lepidopteres" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 216-217. "Jan.-Feb." [12 July] 1950. *Vanessa cardui* and *Colias croceus.*

I. TECHNIQUE

100. Braun, Annette F., "Leaf-mining Lepidoptera with special reference to methods of rearing." *Lep. News,* vol. 4: pp. 3-6. [May] 1950.

101. Brown, F. Martin, "Field techniques for butterfly collecting." *Lep. News,* vol. 4: p. 10. [May] 1950.

102. Evans, William H., "The care of larvae in diapause." *Lep. News,* vol. 4: p. 70. "1950" [Mar. 1951].

103. Evans, William H., "A rearing house for Lepidoptera." *Lep. News,* vol. 5: p. 12, 1 fig. [June] 1951.

104. Gray, P. H. H., "An apparatus for incubating lepidopterous larvae or pupae in nutrition and environment tests." *Lep. News,* vol. 5: p. 35, 1 fig. 1951.

105. Malaise, René, 'How to keep collected insects free from mold and pests in any climate." *Proc. VIII Int. Ent. Congr.,* pp. 926-927. 1950. Recommends the use of acetic ether, in vessels tightly closed or plugged with compressed cotton. [P.B.]

106. Metcalf, Z. P., "Methods in systematic entomology." *Proc. VIII Int. Ent. Congr.,* pp. 152-155. 1950. Describes the author's system of filing and indexing bibliographic material, which he regards as basic to good taxonomic work. [P.B.]

107. Muspratt, Vera Molesworth, "A new ready-made moth trap." *Entomologist,* vol. 83: pp. 56-57. March 1950. Gentian flowers. [P.B.]

108. Way, M. J., P. M. Smith, and B. Hopkins, "The selection and rearing of leaf-eating insects for use as test subjects in the study of insecticides." *Bull. Ent. Res.,* vol. 42: pp. 331-354, 1 pl., 1 fig. Aug. 1951. Describes rearing techniques for 11 spp. of Lepidoptera which are more or less suitable for mass rearing. [P.B.]

109. Williams, C. B., "A light trap for insects." *Lep. News,* vol. 3: pp. 63-64, 2 figs. "June" [Oct.] 1949.

J. MISCELLANY

110. de Ricci, D., "Premier contact avec la faune tropicale" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 321-328, 1 pl. "Nov.-Dec. 1950" [8 May 1951]. Notes on collecting in Brazil, and on status of entomology in Brazil and Argentina. [P.B.]

111. Riley, N. D., "The protection of British insects: an appeal." *Entomologist,* vol. *84:* pp. 99-101. May 1951. Lists 15 spp. needing protection. [P.B.]

112. Roell, Ludwig, "Digne 1949" [In German]. *Zeits. Lepidopt.,* vol. 1: pp. 35-40. 1 May 1950. Account of a collecting trip in the French Alps. [P.B.]

113. Rutherford, C. L., "The next 50 years." *Entomologist,* vol. *84:* pp. 61-63. Mar. 1951. Plea for 'new philosophy of collecting' - especially exact distribution records. [P.B.]

114. Viette, P., "Les travaux de P. Chrétien" [In French]. *Rev. Franc. Lépid.,* vol. 12: pp. 250-256, 282-288. "Mar.-Apr." [11 Dec.] 1950. Bibliography.

115. Wilcke, Hermann, "A season of Lepidoptera collecting in the Austrian Tyrol." *Lep. News,* vol. 3: pp. 7-9. 'Jan.' [Mar.] 1949.

116. Wright, D. W., Q. A. Geering, and J. A. Dunn, "Varietal differences in the susceptibility of peas to attack by the pea moth, *Laspeyresia nigricana* (Steph.)." *Bull. Ent. Res.,* vol. 41: pp. 663-677, 5 figs. Apr. 1951.

SOCIETY AFFAIRS

The Chairman of the Nominating Committee, F. MARTIN BROWN, has presented to the Secretary the following nominations for 1953 officers of the Lepidopterists' Society:

President — WM. T. M. FORBES
1st Vice President — T. N. FREEMAN
Vice President — E. MARTIN HERING
Vice President — YOSHIO OKADA

Executive Council —
To fill vacancy left by death of Prof. Federley —
WALTER HACKMAN

Terms expire Dec. 1955 —
JOSE HERRERA GONZALES
JOHN L. SPERRY

The Secretary reports that the proposed amendments to the Constitution published in the *Lep. News*, Vol. 5. p. 111, were all approved at the Third Annual Meeting of the Society in Ottawa, Canada.

INQUIRY ON TYPES OF HELIOTHIINAE

Information is desired regarding the existence and location of the types of certain heliothid moths listed below.

Some of the species listed below date back a century or more and the types may have disappeared. It is hoped that at least those that are relatively recent have been preserved somewhere and are available for study and comparison.

J. E. Smith (Abbott & Smith)
Rhodophora gaurae
Henry Edwards
Pseudotamila vacciniae
Fabricius
Heliothis obsoleta
Heliothis virescens
Grote
Heliosea celeris
Thyreion snowi
Timora toralis
Schinia brevis
Grote and Robinson
Oxylos citrinellus
Hübner
Heliothis armigera
Schinia bifascia
Schinia tuberculum
Guenée
Heliophana bina
Eupanychis spinosae
Heliothis subflexa
Rhodophora florida
Schinia jaguarina
Schinia arcigera
Strand
Schinia jaguarina
ab. demaculata
Schiffermüller
Heliothis ononis
Canthylidia scutosa
John B. Smith
Manruta elingua
Schinia ciliata
Geyer
Schinia sanguinea

ROWLAND R. MCELVARE
26 Bogart Ave., Port Washington, N. Y., U. S. A.

ERRATA

In Vol. 5, p. 101, penultimate paragraph, "*Afrida notatis**" and "*Metaleura albilinea**" should have been "*Afrida ydatodes*" and "*Metalectra albilinea*".

NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Unless withdrawn sooner by the member, each notice will appear in three numbers. We can not guarantee any notices but expect all to be *bona fide.* Please notify us of any abuse of this service.

Set of Seitz' Vol. 11 (INDO-AUSTRALIAN NOCTUIDAE), English language edition, all published parts, for sale for $20., about ⅔ the recent purchase price. J. G. Franclemont, U. S. National Museum, Washington 25, D. C.

BRAZILIAN BUTTERFLIES and other insects for sale, 1951 catch, papered with full data, mostly classified. Please write to Jorge Kesselring, Caixa Postal 6, Joao Pessoa (Paraiba), BRAZIL.

Wanted: *Argynnis, Speyeria, Brenthis, Boloria,* etc., *Erebia* and other satyrids from all parts of the world. Will collect in all orders of insects, esp. from Denmark, in exchange for these. Georg Christensen, Parmagade 24 III, Copenhagen S, DENMARK.

Catocala herodias Stkr., *Automeris pamina* Neum., and *A. pamina* f. *aurosea* Neum. in series, many other rare moths, offered in exchange for the following nos. from the McD. list: 31d; 35b; 46a; 52b,d,e,g; 79a; 206d,e; 207a,b; 215; 241; 243; 245; 254; 270c; 337b; 423c; 430a; 455h; 456a; 467c; 469. Also want any nearctic *Oeneis* or *Erebia* including common species in series. Send list of desiderata to Paul R. Ehrlich, 538 Academy St., Maplewood, N. J.

Exchange desired to complete my collection of Nearctic and European Lepidoptera. Desire material as follows: all Rhopalocera, all Macroheterocera; and Hepialidae, Yponomeutidae, Pterophoridae, Orneodidae, Pyralidae, Aegeriidae, Cossidae, Zygaenidae, Cochlidiidae, Nolidae, Lacosomidae, Psychidae. Offer in exchange Lepid. of Ohio and elsewhere. Edward C. Welling, 700 E. 240 St., Euclid 23, Ohio.

Palaearctic *Euphydryas* Wanted - long series for research. Wish to exchange Nearctic butterflies or will pay Lepid. Society dues for foreign collectors who can procure long series of needed species for me. Esp. desire Central Asiatic specimens. Nicholas W. Gillham, 4 Washington Square North, New York City, N. Y.

Exchange for South American or southwestern U. S. A. Sphingidae: Seitz "American Moths", English edition, pp. 5-416, pls. 1-51, Castniidae, Zygaenidae, Syntomidae complete; Arctiidae incomplete; pp. 675-711 Bombycidae complete text with pls. 140-141. F. E. Holley, 126 Ash St., Lombard, Ill.

MEXICAN butterflies, papered, with full data, offered in exchange for Theclinae of the world. Inquiry invited. E. W. Fager, Institute of Radiobiology and Biophysics, University of Chicago, Chicago 37, Ill.

Lepidoptera from PERU for scientific purposes collected on order by professional field entomologist for many years serving research entomologists. Felix Woytkowski, Francisco Zela 1067, Letra "L", Lima, PERU.

For sale: Vol. IX, plates only, of Seitz' "Macrolepidoptera of the World." Excellent condition. Otto H. Schroeter, P. O. Box 391, Quaker Hill, Conn.

California moths and butterflies for sale, papered, pinned, to suit. Many pupae available. Inquiry invited. F. P. Sala, 1912 Hilton Drive, Burbank, Calif.

LIVING MATERIAL

Wanted: fertile ova, larvae, and less common moths of the genus *Catocala;* also Aegeriidae. Offer in exchange many spp. of Lepidoptera or other insects. Or will try to secure your needs in this part of the country. A. E. Brower, 5 Hospital St., Augusta, Maine.

Expect to have available at their season, eggs of *P. cecropia, C. promethea, A. luna, A. io* and *C. regalis.* Would like to trade for adult Lepidoptera. List of desiderata and terms of trading upon request. Otto Ackermann, 639 Walnut St., Irwin, Pa.

Living pupae, cocoons, and chrysalids from Europe and cocoons of *Actias selene* (India) for sale or exchange for native pupae, especially Sphingidae and Saturniidae. Native and exotic ova in season. Duke Downey, 51 West 4th St., Sheridan, Wyoming.

Living pupae of European Lepidoptera offered in exchange for pupae of Papilionidae, Saturniidae, Sphingidae from North America. Adolf Witz, Groner Strasse 190, Göttingen, GERMANY.

Eggs and living chrysalids of *THEOPHILA MANDARINA* required. In order to make arrangements, please write first. J. M. Legay, Assistant in Zoology, Station de Recherches Sericicoles, Ales (Gard), FRANCE.

REARING MATERIAL WANTED (eggs, pupae) of rarer Sphingidae, Saturniidae (esp. *Hemileuca*), Arctiidae, *Catocala.* Buy or exchange. Also have large stock *Urania ripheus,* many *Morpho.* Desire correspondence with collectors in Japan and South America. Eugene Dluhy, 3912 N. Hamilton Ave., Chicago 18, Ill., U. S. A.

RESEARCH REQUEST

A faunal study of the butterflies of Oklahoma is now in its fourth year of field investigations. Within a few years it is expected that a biological and systematic treatment of Oklahoma butterflies will be published. Meanwhile, the undersigned cordially appeals to all lepidopterists who have collected in Oklahoma to send him all possible butterfly records, including localities, dates, and any other information. Particularly needed are rearing records, Oklahoma foodplants, and other biological details.

Dr. WALFRIED J. REINTHAL, Central State Hospital, Norman, Okla.

The final issue of Volume 5, i.e. Number 8, was mailed 15 April 1952.

LISTINGS FOR 1952 LIST OF MEMBERS

The 1952 List will be prepared for publication soon. Members whose interests were not shown in the 1951 List or who wish to have the entry changed should so notify the Editor as soon as possible. Corrections of names and addresses should also be brought to his attention.

ADDITIONS TO THE MEMBERSHIP LIST*

Allyn, Arthur C., Jr., 100 West Monroe St., Chicago, Ill.

Brumbaugh, Norman J., 1808 Moore St., Huntingdon, Pa.

Carleton, Bukk G., 3rd, Parade Hill Lane, New Canaan, Conn.

Chase, Hazel (Mrs.) 272 Union St., Galion, Ohio.

Crampton, Charlene E. (Miss), Rt. #1, White Pigeon, Mich.

Eisner, Curt, Violenweg 7, 's-Gravenhage (The Hague), NETHERLANDS.

Graves, John D., 1711 Short St., Berkeley 2, Calif.

Hartig, Fred (Count). Via Gregoriana 25, ITALY.

Heitzman, John R., 2438 Sterling Ave., Independence, Mo.

Jewett, Stanley G., 7742 S. E. 27th Ave., Portland 2, Ore.

Johnson, F. L., United Africa Co. Ltd., P. O. Box 22, Akim-Oda, GOLD COAST, AFRICA.

Johnston, David W., Box 377, Broken Bow, Nebr.

Knudsen, John P., Oglethorpe University, Georgia.

Kuzuya, Takeshi, Minami-Sonomachi 1-3, Nakaku, Nagoya, JAPAN.

Latham, Roy, Orient (Long Island), New York.

MacLeod, Ellis G., 8810 Manchester Rd., #2, Silver Spring, Md.

MacNeill, C. Don, Dept. of Entomology, 112 Agriculture Hall, University of California, Berkeley 4, Calif.

McKay, Margaret (Miss), Div. of Entomology, Science Service Bldg., Ottawa, Ontario, CANADA.

Nevile, H. Ralph, The Rectory (Top Flat), Leire, near Rugby, Warwicks., UNITED KINGDOM.

Obraztsov, Nicholas S. (Dr.), 110 Maple Ave., Sea Cliff (L.I.), N. Y.

Ogata, Masami (Dr.), Ogata Hospital, No. 18, 3-chome, Imabashi, Higashi-ku, Osaka, JAPAN.

Otdel, Knizhny, Akademii Nauk, Ul. Kropotkina, 16, Moscow, U. S. S. R.

Roever, Kilian, R. F. D. #2, Jackson, Tenn.

Ryan, Charlton (Miss), 1822 Huff St., Wichita Falls, Texas.

Scott, Leonard M., 6537 S. E. 83rd Ave., Portland 66, Oregon.

Shulgin, Michael, 1113 Findlay Ave., The Bronx, New York, N. Y.

Simmons, Robert S. (Dr.), 1305 Light St., Baltimore 30, Md.

Starrett, Daniel, P. O. Box 1074, Sparta, New Jersey.

Throne, Alvin L., 3916 N. Maryland Ave., Milwaukee 11, Wis.

Wilson, Bruce V., 815 N. Chipman St., Owosso, Mich.

Zepf, William Wright, 2 Mechanic St., Haddonfield, New Jersey.

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17 November 1952

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.,* mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.,* personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

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Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

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HARRY FEDERLEY (1879 - 1951)

On 13 November 1951, Dr. HARRY FEDERLEY, emeritus Professor in Genetics of the University of Helsinki and member of the Executive Committee of the Lepidopterists' Society, died unexpectedly in Helsinki. In him we lost one of the most famous representatives of modern genetics and experimental lepidopterology.

HARRY FEDERLEY was born in Viipuri in the former South-Eastern Finland on 22 March 1879, and was 72 years old at the time of his death. He graduated at the University of Helsinki, zoology being his main subject. After having taken his doctor's degree in 1907 FEDERLEY was given *licendia docendi* in zoology, 1909, and in genetics, 1915, at the same university. In 1923 he was appointed Professor of Genetics.

The Lepidoptera were the most important subjects in HARRY FEDERLEY'S research work during his whole life. In his youth he had already acquired a

good knowledge of species by diligent collecting work in different parts of Finland. His mind was, however, set to deeper investigations. In accordance with the theories of evolution at the turn of the century, he tried to discover whether Haeckel's biogenetic law could be applied to the succeeding instars of lepidopterous larvae. For this purpose he reared from eggs the many different Lepidoptera — mainly spinner moths — during several years and pictured their development in minute details in the most beautiful and masterfully coloured figures. This work was never finished, because FEDERLEY began to question more and more the main general applicability of the biogenetic law, and moreover because his results did not fit in with certain lamarckistic ideas of the evolutionists of that time.

While having to rear multitudes of caterpillars FEDERLEY also made various experiments with the chrysalids and imagos. Among others things he treated chrysalids with extreme temperatures and studied the effect on the wing colouring of the imagos. By using a microscope he could demonstrate changes in both form and size of the wing scales caused by the temperature treatment, this leading also to changes in the colouring and pattern of the wing.

Crossing-experiments made with the numerous moths obtained in his breeding experiments brought FEDERLEY'S investigations over to genetics, — the science which became his essential line.

FEDERLEY had chosen the genus *Pygaera* as the main subject of his crossing-experiments and this genus preserved a central position in his works more than 40 years. His most important paper "Das Verhalten der Chromosomen bei der Spermatogenese der Schmetterlinge Pygaera anachoraeta, curtula und pigra sowie einiger ihrer Bastarde" was published in 1913. It aroused much attention and has later on confirmed its position as one of the classic works in genetics. In this and some later works, apart from the *Pygaera* species, dealing with species hybrids of the hawk-moth genera *Smerinthus* and *Deilephila* and the spinner-moth genera *Dicranura, Cerura* and *Drepana,* FEDERLEY has thoroughly explained the heredity and chromosome conditions in species hybrids. Before that the significance of the chromosomes in heredity had not been fully realized. FEDERLEY was one of the first who purposefully tried to associate the results of crossing experiments and chromosome studies.

In crossings of *Pygaera* species FEDERLEY arrived at certain results which were not in conformity with the Mendelian laws. The constant intermediate heredity, stated by him in these cases, proved later to be a characteristic feature of many species hybrids. FEDERLEY also found the correct explanation of this phenomenon in the exceptional behaviour of the chromosomes in conjugation in the hybrid. Chromosomal conditions proved also to be responsible for the sterility common in species hybrids. Further, he found that the chromosomes conjugated to a different extent in the female and male of the same hybrid. This explained the different results in back-crossing depending on which sex of the hybrid had been used.

FEDERLEY'S lepidopterological studies were not limited to species hybrids only. Among others he has studied polymeric genes determining the wing colour. For this purpose he made extensive crossing experiments with the tiger moth *Spilosoma lutea* and its dark form *zatima.* He published further a large work on the chromosome conditions of Finnish Rhopalocera. By this

work he found species in all families with chromosome numbers differing remarkably from the modal number of the group. This and his observations concerning the crossings of *Dicranura* species showing that the chromosome numbers of certain hybrids are higher than the sum of the chromosome numbers of the parental species, point to the possibility that the centromere in the chromosomes of Lepidoptera might be what we call a diffuse centromere, distributed over the whole chromosome. This would make the fusion and fragmentation of chromosomes possible as structural changes during the chromosomal evolution in Lepidoptera.

FEDERLEY'S numerous papers, most of which were published in the main periodicals of the branch, made him known in the whole genetic and lepidopterological world. His long periods at foreign scientific institutions, and his active participation in the international congresses of the branches he represented, further contributed to this. He was also awarded many scientific honours. He was honorary doctor of the universities of Lund and Copenhagen and the honorary or correspondence member of numerous scientific societies both at home and abroad, as far as America and Japan. In the scientific life of his country he long held a very central position.

HARRY FEDERLEY was as a man a great personality. His ready intellect made it possible for him to solve the most complicated problems. He always remained true to himself and defended bravely, when necessary, the point of view he thought just. Through his kind and helpful disposition HARRY FEDERLEY gained many friends, who now after his departure from this life revere his memory in deep regret.

ESKO SUOMALAINEN,
Institute of Genetics, The University, P.-Rautatiekatu 13, Helsinki, Finland

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PREPARING LEPIDOPTERA FOR CLASS STUDY

by JOHN N. BELKIN and WILLIAM A. MCDONALD

Of the major orders of insects the Lepidoptera are probably the least adequately covered in most introductory courses in entomology. Students are inclined to place more reliance on general appearance and color patterns than to structural characters and to compare specimens with numerous published figures rather than determine them with the aid of keys. Instructors often encourage this attitude by restricting the material to a few conspicuous species. At the same time the phenomena of mimicry and other types of adaptive coloration are usually illustrated with butterflies and moths.

This situation is largely due to the fact that the identification of the families of Lepidoptera is dependent to a large extent on the examination of details of wing venation which are obscured by the coloration of the scales. To circumvent this difficulty in observation two methods have been used in the past. One involves removing wings, bleaching them, and mounting on slides, a very laborious and time-consuming method of preparation by the instructor. The other consists of temporarily clearing the area of the wing to be observed by the application of a small quantity of alcohol or benzene by means of a fine brush, an exasperating procedure for the student. Both methods result in a very superficial treatment of this important order of insects.

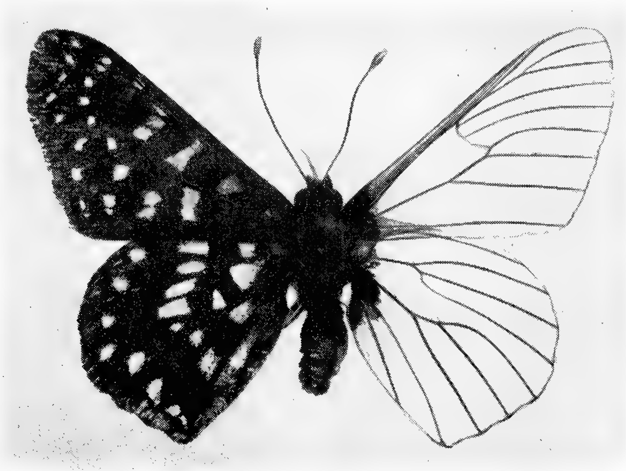

Fig. 1. Spread butterfly with right side bleached to show venation

Recently we have used successfully a simple method of preparing butterflies and moths for student identification. This method to our knowledge has not been used before, probably because most entomologists are loathe to "ruin" a spread lepidopteron by disturbing in any way its scale pattern. Essentially the procedure is as follows:

1. The right fore and hind wings of a pinned and spread specimen are dipped into 95% alcohol in a sufficiently deep container to wet the scales, veins and membrane. The subsequent bleaching will extend only as far

as the wings have been wetted. The specimen should not be left in the alcohol too long as there is a tendency for the long scales of the thorax to draw up the alcohol.

2. The wetted wings are immediately dipped into full strength Clorox (a commercial preparation containing approximately 5.25% sodium hypochlorite in water) or a similar aqueous solution of a hypochlorite such as photographic hypo. The wings are left in the Clorox until a sufficient degree of bleaching has been obtained. This is usually about one or two minutes, but is less with very delicate forms and considerably more for very heavily pigmented and thick winged forms. It is not advisable to leave the specimen more than a few minutes in the aqueous solution, for the wing may become softened. Therefore we prefer to use a strong solution for a shorter period. It is also preferable not to bleach the specimen too much, for it becomes considerably lighter after it dries.

3. After the desired bleaching has been obtained, the cleared wings are transferred to another container of 95% alcohol for a few seconds to wash off the excess bleach and to dehydrate and stiffen the wings. The wash alcohol should be changed frequently to be effective.

4. The specimen is removed from the wash alcohol air dried for a few minutes. If it is greasy it may be advisable to dip it for a few seconds or minutes into benzene.

Large or medium-sized species with moderately heavy wings that have been properly spread require no special precautions in this method. In more delicately winged forms, such as most geometers and some lycaenids, the wings have a tendency to collapse and draw together when they dry, particularly if the bases of the wings were injured in spreading. To correct this, a clean microscope glass slide may be used to pick up the wings from the wash alcohol. While still wet the wings are spread on the slide in the desired position and allowed to dry. If the slide is clean the wings will come off easily when dry.

Micros present a special problem. We have obtained excellent preparations, with the fringes in normal position and all details of venation clearly evident, by supporting the wings with a single piece of cellulose acetate film of 0.25mm thickness (Fig. 2). The film is bent up at a right angle at the base and attached either to the pin or to the cork with a drop of clear finger nail polish (also passed through the pin in simple mounts). It is then bent down at an angle outwardly under the wings to support them. It is important not to extend the support too near the body. The wings may be anchored to the support at the base if desired, but this is usually not necessary if the attachment to the mount is firm. After the specimen is thus prepared the above-outlined procedure for wetting, bleaching, and dehydrating is followed. The supports are left permanently attached to the specimen. Larger species may be handled in the same manner, but they require a thicker celluloid support.

An alternate method for micros, one requiring less care and dexterity, consists of cutting off one set of wings and anchoring them with a small drop of finger nail polish to a celluloid slip. The latter is then handled as above and finally pinned under the remaining parts of the specimen and anchored to the pin with a drop of finger nail polish.

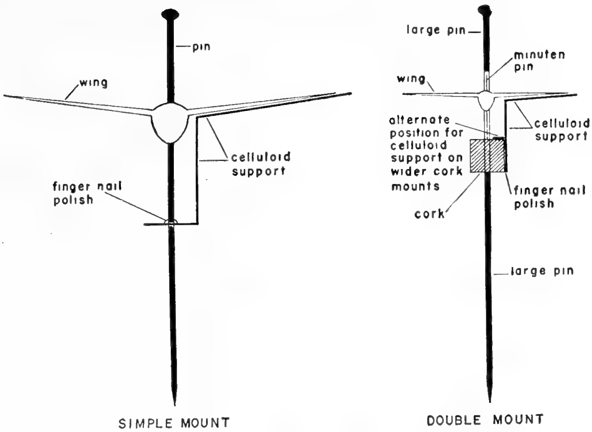

Fig. 2. Supports for delicate specimens

To obtain best results it is advisable to spread the specimens with the hind wing not inserted as far forward under the fore wing as is customary, since it is often necessary to observe details of venation of the anterior portion of the hind wing and posterior portion of the forewing. If conventionally spread specimens are used, proper bleaching of this area is insured if the two wings are lifted apart slightly in these areas while the specimen is in the wetting solution.

This method results in specimens that show details of wing venation much more clearly than even stained microscopic preparations. With a little care in bleaching a strongly contrasting venation can be obtained. The left side of the specimen and its body retain the original coloration which may be needed for identification purposes (Fig. 1). In examining the venation in small specimens it is suggested that oblique transmitted light be used for greater contrast. The greatest advantage to the instructor is the ease and speed of preparation as well as the economy in specimens. For quiz purposes entire specimens of common species may be bleached to discourage undue reliance on color patterns. Other details of the anatomy of Lepidoptera obscured by scales may be clarified greatly by bleaching, for example labial palps, patagia, tegulae, tympana, and genitalia.

We believe that this method may have application outside of class material, but it would be hard to convince lepidopterists to use it on valuable collection specimens. The use of bleaching in the preparation of insect material in general has been greatly neglected. We find that in heavily pigmented structures, such as elytra and head capsules of beetles, a much better picture is obtained if bleaching with Clorox is used instead of cleaning with potassium hydroxide. A combination of the two is also very useful for microscopic preparations since it greatly reduces the time needed for clearing the specimen and disturbs less the natural conformation of sclerites. We have not used other bleaching agents, such as hydrogen peroxide. These might prove useful with different types of material.

Dept. of Entomology, University of California
Los Angeles 24, Calif., U. S. A.

SOME STATISTICAL CONCEPTS IN TAXONOMY

by NICHOLAS SHOUMATOFF

In my profession of process engineering in the pulp and paper industry, I have been confronted on numerous occasions with problems involving the statistical analysis of observational and experimental data. I have been impressed with the power of analysis made available by modern statistical methods. The possibilities of applying these methods to the taxonomy of Lepidoptera, as discussed in the recent series of articles in the *Lep. News* by F. MARTIN BROWN, have therefore interested me keenly.

The statistical methods of modern experimental science were largely developed in biology, although some of the most significant early contributions (1908) were made by "Student", an anonymous industrial engineer. The full power of today's methods, however, based on the principle of fiducial probability, is largely due to R. A. FISHER, whose specialty of genetics is certainly related to taxonomy. I therefore anticipated no difficulty in attempting statistical reversion from technology to Lepidoptera. For this reason it was quite a surprise to find that, in Mr. BROWN'S article in the *News*, Vol. 5: pp. 64-66, some basic concepts are recommended which are quite different from those which I have encountered elsewhere.

Mr. BROWN indicates that in taxonomy valid tests of significance should be based on probability levels of a vastly different order of magnitude than are commonly used in other branches of science. He further indicates that the required probability level can be uniquely determined from the size of the sample and the size of the population from which it is drawn. This was illustrated with two examples, without details of the mathematical procedure employed.

I am not in a position to take issue with these recommendations directly, but I would like to point out (in the hope of obtaining information which may resolve this conflict) how they differ from what I have understood to be the basic concepts underlying modern procedures of statistical inference.

The first principle involved in the case is that statistical methods do not establish what can be known with certainty, but only what can be expected with any desired degree of confidence. The specification of the degree of confidence, which is necessary for any test of significance, is purely subjective, although certain definite criteria have been established by custom. Published tables of statistical functions frequently do not extend beyond the 99.9% level of confidence.

The implications of selecting the level of confidence should be clearly understood. If in a given test the 95% confidence level is established as the criterion of significance, it means that in accepting the significance of results which meet this criterion the chance of error is 5%. The chance of error in rejecting the significance of a result which does not meet this criterion is not uniquely determined by the selected confidence level, but depends on the degree of difference between the true and assumed values of the quantity being investigated. It may be as high as 95%. It may be seen that if the confidence level is changed to a higher value to reduce the chance if accepting a non-significant result, the chance of rejecting a result which may be significant is correspondingly increased. Greater certainty in the first type of judgement can be acquired only at the price of reduced sensitivity in the

second type of judgement. In certain investigations, particularly those which are in a preliminary stage, it is often desirable to follow up an indication even though in the end it may prove to be insignificant. In such cases a lower confidence criterion must be allowed. However, the minimum confidence level commonly used is 95%, which with large samples is approximately equivalent to two standard deviations.

It is understandable that a taxonomist would like to exercise the highest degree of confidence in assigning names to populations of Lepidoptera so that the names will have enduring validity rather than clutter up the literature with synonyms. On the other hand, it is doubtful whether, in certain groups at least, the subspecific structure has been so clearly defined that one can afford to overlook indicated differences at a lower level of confidence. In "The Karanasa Butterflies" (*Annals Carnegie Museum,* 1951) AVINOFF and SWEADNER assigned names to every local population that they were able to distinguish. In doing so they realized that future investigations based on more complete data might not uphold all these names. This was felt to be a lesser evil, however, than the danger of confusing two really distinct entities under the same name, as has frequently happened in earlier literature on this group.

It should always be borne in mind that the magnitude of variation corresponding to any given level of confidence is not fixed but depends on the amount of information available. In the absence of a complete census, the true random variation of an entire population is never known as such, but must be estimated from a sample. A most important concept in this connection is the number of degrees of freedom (number of observations minus number of restraints) available for calculation of and comparison with the estimate of error. For example, the number of standard deviations at each probability level is a variable, depending on the number of degrees of freedom, in accordance with "Student's" t-function, tables of which can be found in almost any current book on statistics. The fixed values listed in Mr. BROWN'S article correspond to infinite degrees of freedom, and are approximately true for large samples only. In most actual cases there are several methods of calculating the estimate of error from the same data, each with a corresponding number of degrees of freedom. A typical example is testing the difference between the means of two samples. If specimens are available from two localities so that they may be arranged in two parallel time series to form, say, ten simultaneous pairs, and if one measurement is made on each specimen, the mean difference between the two localities can be tested by comparison with four different estimates of error as follows:

Square Deviations of	Degrees of Freedom	Value of "t" at 95% Confidence
Individual values from general mean	19	2.093
Individual values from mean each locality	18	2.101
Differences in each pair from zero	10	2.228
Differences in each pair from average difference	9	2.262

The last of these methods has the least degrees of freedom and the highest "t," yet it is often the most sensitive method because the variance among pairs and between localities has been eliminated from the estimate of

error. Whichever of these four methods yields the highest confidence level is the one whose result must be considered. These differences in sensitivity due to different sources of variation should not be confused with the general principle that, regardless of the methods of statistical reduction employed, all tests of significance of the same hypothesis based on the same sources of variation in the same set of data are bound, if correctly carried out, to yield exactly the same result, barring only the use of inefficient statistics.

With the small sampling theory illustrated above, confidence limits can be established just as exactly from small samples as from large samples. However, with larger samples, the limits are smaller. This is due to three separate effects:

1. The degrees of freedom, not the total number of observations, is used in calculating the mean square deviation.
2. The value of "t" depends on the degrees of freedom.
3. The standard error of a sample mean varies inversely as the square root of the sample size.

Eventually a point is reached where relatively little is gained by increasing the sample size. This has been called the principle of inertia for large samples.

The previous discussion is intended to show that statistical methods are objective only insofar as they establish accurate betting odds, but the final step of the procedure, whether or not to accept these odds, involves a subjective decision. In contrast, Mr. BROWN has, I believe, suggested that there is an absolute scientific basis for completing this final step.

A second fundamental concept involved in this case has to do with the character of the population. The basic calculus of statistical analysis has been derived from the assumption of random sampling from an infinite population. All actual populations are of course finite. Fortunately, if the populations are very large in proportion to the sample, the calculus of infinite populations can be applied with entirely negligible error. The principle of inertia applies to population size as well as sample size. In taxonomy, on the other hand, one is not primarily concerned with actual populations. A sample containing specimens taken over a period of time exceeding the life span of individuals certainly represents more than one actual population. Conclusions drawn from the study of the sample usually refer not only to the actual populations represented, but also to an unspecified number of future populations. The taxonomic unit is an abstraction which does not actually exist in its entirety at any one time. It is partly actual, partly hypothetical, and in effect infinite. It does not appear, therefore, that significance tests based on the calculated size of an actual population are pertinent to the problems of taxonomy, whether or not they are statistically correct. If Mr. BROWN'S reasoning on this point is followed to its logical conclusion, an infinite deviation would be required if an infinite population is considered.

In conclusion, I would like to repeat that these thoughts have been assembled not in a spirit of criticism but in the hope of reaching a more complete mutual understanding, as all those who work in the same field should have. Properly used statistical methods can do much to promote mutual understanding in taxonomy, and Mr. BROWN'S articles with their high standard of clarity are undoubtedly a most significant contribution in this direction.

Box 333, Bedford, N. Y., U. S. A.

STATISTICS AND TAXONOMY AGAIN

by F. MARTIN BROWN

Mr. SHOUMATOFF'S article is a valid criticism, in the light of current statistical thought, of my series of articles in *The Lepidopterist's News.* It requires a defence of my position. Just as taxonomy is a tool of systematics, I propose to make statistics a more useful tool of taxonomy. Neither taxonomy nor statistics is an end in itself; each is an intermediate between unassimilated information and an understanding of life.

The original tenets of statistics were developed by KARL PEARSON at the turn of the century to aid the study of variation in natural populations. Since then the emphasis in biology has been toward the study of limited populations living under laboratory controlled conditions. This has developed the statistics of small numbers, a potent laboratory tool. R.A. FISHER'S work on probability opened fruitful ways of establishing "betting odds" for experimental work. The general result of these advances has been to establish the sanctity of philosophically evolved "limits". This is dangerous! It is a return to Greek philosophical science. It is pressing Nature into preconceived limits instead of seeking natural "limits". This I consider putting the cart before the horse.

My divergence from the classical statistical approach is not original. In the field of anthropology metrical research reached a point of utter confusion. The classical approach had led to a morass of meaningless data. W. H. SHELDON cut the Gordian Knot with radical surgery! He sorted individuals into categories by non-metrical observation, much as a taxonomist sorts out forms or subspecies. He then set about finding the statistical differences among the measurements made on these categories. What he did was to establish a taxonomic system of human physique and then discover the statistical constants of the system. The result has been a useful system for classifying human beings and thus relating these categories to other fields that impinge upon us.

What I am doing is seeking out the statistics of an accepted taxonomic system. Such an approach does not allow the investigator to say, "I will accept a 1 in 100 — or any other preconceived ratio — as the limit of subspecific difference", the currently accepted statistical approach. It imposes upon him the discovery of what ratio of chance is accepted by Nature in the light of currently accepted taxonomy.

Fountain Valley School, Colorado Spring, Colo., U. S. A.

FOOTNOTE TO BROWN'S STATISTICS

Mr. BROWN in his recent articles in *The Lepidopterists' News* takes little note of the fact that variation may not fit within the statistically "normal" pattern. A convenient test may be made. After dividing the material into classes of equal range of the dimension considered, take the **differences of the logarithms** of the numbers in the classes, and plot them in order. If they approximate an oblique straight line, the distribution is normal; if one gets a sinuous line the distribution is bimodal, and other patterns suggest more complicated patterns, not immediately suitable for statistical analysis.

WM. T. M. FORBES, Cornell University, Ithaca, N. Y., U. S. A.

MIGRATION OF *CATOPSILIA* BUTTERFLIES IN INDIA

by Ernest M. Shull

From September 19 - 24, 1946, I witnessed a southerly movement of butterflies, mostly of the genus *Catopsilia,* at Palghar, Thana District, Bombay Presidency, India. Palghar is located on the plains about five miles from the coast. India is, of course, a part of the Indo-Malayan faunal region, which covers the tropics of Asia and the islands lying south of that great continent, including Australia.

The movement of butterflies takes many different forms, but perhaps the most recorded is the movement of large swarms or "clouds" of butterflies which darken the sky. Some flights have been estimated to contain more than a thousand million individuals.[1] Such a sight is an event in the life of a naturalist. The flight I am reporting may be of some scientific interest.

On the morning of the nineteenth I saw a number of beautiful middle-sized yellow butterflies flying in a steady line. Soon I had caught sixteen of them. They all proved to be of one genus, *Catopsilia.* After papering the specimens, I watched the movement of butterflies more carefully. It soon became evident that this was not an ordinary flight but a migration.

According to Peile, species of *Catopsilia* often migrate in swarms,[2] but this flight was of quite a different type. On this day and the five days following the Emigrants (*Catopsilia*) were not flying in swarms, but in three distinct lines across the mission compound, usually starting about 10:00 A. M. and continuing until 3:00 P. M. Each of the three lines was approximately one hundred yards from any other. This movement resembled a group of school children playing "follow-the-leader," except their course was straight and in a southerly direction. They had a swooping flight, closing their wings completely between strokes. When I stood in the direct path of the migration, they would not deflect their course to either side but instead increased their flying height (incidentally, just out of reach of the net). Only a very few stopped to rest, and then only for a few seconds on the undersides of a leaf. The red-flowered bush (*Hibiscus*), which was directly in the line of migration, temporarily attracted a few of the passersby. In order to net a resting specimen I stood near the bush with my net in readiness. One step forward and a quick swing was sometimes successful. The vast majority, however, of this migrating horde pressed relentlessly onward without faltering or yielding to wayside attractions.

Without any clocking device the speed of migration was roughly estimated to be between ten and fifteen miles per hour. In ordinary flight *Catopsilia* are rapid fliers, but in migration their flight is even faster.

At one point of observation some tabulations were made, counting the individuals in one line as they passed overhead. During the half-hour 150 were counted. Using this as an average, and taking into consideration that

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[1]See "Butterfly Travelers," by C. B. Williams, *National Geographic Magazine,* May, 1937. This article gives an excellent account of butterfly migration.

[2]H. D. Peile, *A Guide to Collecting Butterflies in India,* p. 59.

there were three lines of migrants for a five hour period, it was estimated that 3500 to 4500 individuals were in the first day's flight. At best this is only a rough estimate, because the hour between 10:00 and 11:00 A. M. was not as heavy with migrants as were the hours between 11:00 A. M. and 2:00 P. M. Also after 2:00 o'clock the flight began to taper off. Rechecking on subsequent days, however, verified the comparative accuracy of the above figure.

From this movement four species of the genus *Catopsilia* were collected; namely, *C. pomona* Fabr. (The Lemon Emigrant); *C. crocale crocale* Cram. (The Common Emigrant); *C. pyranthe minna* Herbst (The Mottled Emigrant); and *C. florella gnoma* Fabr. (The African Emigrant). Males and females were collected of these four species.

Although the migration continued for six days, the migrants were never so steady as on the first "heavy" day. Several members of the Family Hesperiidae (The Skippers) and one species of the Subfamily Plebejinae (The Blues) were collected from the migrating group and sent to the American Museum of Natural History. On the first day from 11:00 A. M. until 2:00 P. M. the movement of Skippers was recorded, the estimation being 200 - 250 per hour or a total of 600 - 750 in the thrree hour period. During the first three days the Skippers and the Blues accompanied the migrating *Catopsilia;* however, their manner of flight was more varied and never in such regular lines. Occasionally small swarms of Skippers were seen, so it was difficult to estimate their number. The Blues were scattered among all the others and no count was taken. The Skippers flew even faster and higher than the *Catopsilia,* so capturing them was a real task. Even with a long-handled net I had to jump as high as possible and then swing at a flying target. So only a few were caught.

Ahwa, via Billimora, Dangs District, B.P., India

MIGRATION OF THE MONARCH BUTTERFLY DURING THE WINTER

by GEOFFREY BEALL

The present note is a brief report on migration of the Monarch butterfly, *Danaus plexippus* Linné, during the winter (December 10 through May 5) in Florida. The data are of particular importance because they substantiate the suspicion that the Monarch is constantly in migration although only at certain seasons does this migration attract popular attention because of the number of butterflies involved.

The data were sent to the writer by Mr. & Mrs. KARL HODGES, as a response to his plea for information from local naturalists in *The Lepidopterists' News,* vol. 5: 37-40. The data are an example of the valuable information that can be collected by local naturalists.

Mr. & Mrs. HODGES live at Indialantic which is on a very long island, about three-quarter miles wide off the coast of much of Florida. Between the island and the mainland is a long narrow lagoon called Indian River, of about the same width. Beyond the island is the Atlantic. They are just above latitude 28° or about half way down the state.

They made observations every day and on certain days saw numbers of Monarchs, as follows:

Date	Number	Movement	Wind
1951			
Dec. 10	3	S	Calm
Dec. 11	2	S	SW
Dec. 12	4	S	WSW
Dec. 13	1	S	NW
Dec. 14	7	S	SE
Dec. 15	8	S	SW
Dec. 16	2	S	NW
1952			
Jan. 14	1	None	....
Jan. 14	1	S	....
Jan. 14	1	N	....

Date	Number	Movement	Wind
1952			
Mar. 12	1	N	SW
Mar. 13	1	N	SW
Mar. 13	5	N	NW
Mar. 14	10	N	NW
Apr. 1	2	N	....
Apr. 2	1	N	...
Apr. 4	15	N	NNW
Apr. 4	1	None	NW
Apr. 5	2	N	SW
Apr. 17	2	N	NW
No more Monarchs through May 5.			

These data show clearly that during December the flight was strongly southward and during March and April as strongly northward. The almost complete lack of Monarchs during January and February is noteworthy and suggests that the butterfly removes to a latitude lower than 28°.

The unanimity of the flight is curious.

The fact that the flight tends to be always north (actually slight northwest or north) or south is quite understandable because the Monarch has a strong tendency to move parallel to shorelines and under the circumstances of Indialantic only the northward or southward tendencies of movement can manifest themselves. Indeed, the straightened circumstances of Indialantic make it singularly favorable for observations of the present kind.

The data show that the Monarch was responding to wind in what seems to be its usual fashion, *i. e.,* flying into it. Thus of the 27 flying south in December, 24 flew into southerly winds. Of the 40 Monarchs flying north in March and April, 33 flew into northerly winds, 4 were following southerly winds (and for 3 no wind is given).

It is to be hoped that Mr. & Mrs. HODGES will continue their patient recording of occasional butterflies, for if they do so they may be able to inform us whether the Monarch does migrate constantly throughout the year and when its tide of migration turns. Let us also hope that other observers in the low latitudes will join them.

University of Connecticut, Storrs, Conn., U.S.A.

BOOK REVIEW

THE BUTTERFLIES OF VIRGINIA. By Austin H. Clark and Leila F. Clark. *Smithsonian Miscellaneous Collections,* vol. 116, no. 7: vii + 239 pp., col. frontisp., 30 pls. 20 Dec. 1951. Available from: Division of Publications, Smithsonian Institution, Washington 25, D.C., U.S.A., in paper cover, $2.25.

Collectors of Lepidoptera who reside in one area for several years have the opportunity to provide detailed data on the genuine characteristics of the natural lives of their local species. It is most unfortunate for science that such collectors rarely attempt to keep records of all the minutiae they encounter, of flight periods, behavior, variations in abundance from year to year, foodplants, flower preferences, movements, and many other matters. Still fewer gather together and analyze their records and publish the results. A singular exception is Mr. CLARK, who is not only a distinguished museum zoologist, but also an observant field naturalist whose enthusiasm has never waned. In fact, that enthusiasm has been transmitted to a succession of younger men whose field records have greatly extended the thoroughness of this new book on Virginia butterflies. North American lepidopterists are generally acquainted with Mr. CLARK'S earlier "The Butterflies of the District of Columbia and Vicinity" (*U.S.N.M. Bull.* 157; 1932), which has taken a unique position as a superb treatment of a local fauna.

He and Mrs. CLARK have worked on an intensive study of the butterflies of Virginia steadily since 1933. They personally "visited all the 100 counties in the State at least twice, most of them many times". In addition to their personal records from "more than 800 localities", they have been provided with records and specimens from at least ten collectors who each spent much of several years in Virginia localities.

The results reported here undoubtedly provide the fullest information on distribution and flight periods ever published for a New World area of similar size. They will be of great value as a point of reference for comparison with future findings in other parts of North America.

To the reviewer's regret very little else than detailed distribution, local environment, and flight periods is included. There are keys to identification of all the species, original keys utilizing color and superficial structure, which are the best such keys I have ever seen. No attempt is made to prepare a key for female Hesperiinae. The species and subspecies are illustrated in good black-and-white photographs. Eight are also figured in color on the frontispiece.

A rapid check indicates that substantial information on larvae and foodplants is given only for *Papilio glaucus, Calpodes ethlius,* and *Atrytone conspicua.*

As expected, the family classification follows the system Mr. CLARK proposed recently for the butterflies of the world (see *Lepid. News,* vol. 2: p. 73; 1948). But no indication appears anywhere of the characters by which his families Apaturidae, Nymphalidae, Argynnidae, and Danaidae may be distinguished, even in Virginia. This is unfortunate on two counts: first, most users of the book will be utterly unfamiliar with these names as used and require some explanation; second, the paper establishing these extreme splits of the former Nymphalididae did not properly characterize them, little being mentioned other than broad larval structures and certain habits *(Proc. Ent. Soc. Wash.,* vol. 49: pp. 148-149; 1947).

Four very difficult problems of relationship and distribution are discussed at length and much new information is added to the published record.

1. *Papilio glaucus* is said to have two general forms with all manner of intergrades found at times. One typically is said to have: the blackish female; male with rounder fore wings, broader tails, etc.; larvae living high in trees, especially on *Fraxinus, Magnolia, Liriodendron;* and principally southern range. The other is contrasted as having: male-like female; male with pointed fore wings, narrow hindwings and tails; larvae mainly on bushes and low limbs of *Prunus, Betula, Populus;* and primarily occurring from New England northward. The reviewer's records suggest that the distinction of foodplants and larval altitude are not supportable or are an accident caused by the range limits of the plants. Certainly the male-like females in Connecticut are partial to *Fraxinus* and to very tall *Liriodendron* (one of the best gathering points I have ever seen for *P. glaucus* larvae is the pair of giant *Liriodendron* in the yard of the

Museum of Comparative Zoology at Harvard University). In Missouri and adjacent Illinois, where *P. glaucus* is distinctly of type one, larvae were commonly taken on low leaves of *Prunus* and lilac. The CLARKS note, however, that in almost any region both forms may occur, the difference in proportions being the important point. The population characteristics are given for each part of the wide range of *P. glaucus* (except for "subspecies *rutulus*"), and this is one of the most interesting parts of the book. Now it remains for another study to extend the analysis of these populations with data showing precise proportions of types, exact measurements of wing shape and markings, and illustrations in graphic form, as outlined by Prof. Dr. WOHLFAHRT (*Lepid. News*, vol. 6: pp. 13-27; 1952). The seasonal forms found in *P. glaucus, Battus philenor,* and *Graphium marcellus* are described and explained with care.

2. *Colias eurytheme* and *philodice* are clearly not well understood. While they are cited as distinct species in their titles (pp. 93,97), *eurytheme* is repeatedly called a subspecies of *philodice* (pp. 96, 97), and on page 1 we read "*Colias chrysotheme eurytheme*". Some interesting notes give the historical occurrance of the two forms in the Virginia vicinity. *C. eurytheme* is used for any specimen with even a trace of orange on the upperside; *C. philodice* must be pure yellow. This, though the simplest breeding experiments show that a brood with three pure yellow (*philodice*) and one orange (*eurytheme*) grandparents would fall into the CLARKS' "*eurytheme*" category.

3. *Limenitis astyanax* is treated as a race of *L. arthemis,* as was recently done by R. L. CHERMOCK and A. B. KLOTS. White-banded specimens in Virginia are called form *albofasciata* of *astyanax* because they "are undoubtedly of local origin cannot be directly related to white-banded individuals living farther north from which they are separated by a broad area in which no white-banded individuals occur" (p.50). But then one reads (p.51) "A large female agreeing closely with others from the Adirondacks of New York and with Drury's figure of *arthemis* was taken at Charlottesville, Albemarle County very worn and appears to have come from a considerable distance, possible from West Virginia or the mountains of Pennsylvania."

4. *Danaus plexippus megalippe,* the tropical American race, is unhesitatingly reported from several Virginia localities, although not one case of immigration has ever been proven, and the *megalippe* type of coloration may be part of the variation pattern of *plexippus.* The Clarks state (p. 68) that if this were so "they should be found in the west". However, the Clarks themselves mention a specimen from Decatur, Illinois, and presumably the six records they give for Virginia *megalippe* are taken from a much greater number of eastern *D. plexippus* than they had available from west of the Appalachians. It is widely held that *megalippe* is not migratory or at least much less so than *plexippus.* The CLARKS suggest a seaport origin for U.S.A. *megalippe,* a tempting but still highly speculative idea.

Each of these four cases can be substantially clarified by careful rearing studies. These are some of the exciting problems posed but not solved by this book.

A further point seems to require comment. Once again *Anthocharis genutia* is reported to be double-brooded with an incomplete second brood immediately following the first. Once again the proof can come only by rearing the second brood from the first under natural conditions and this has never been reported in print to my knowledge. The field collections suggest faintly that a second brood may actually appear, but the grounds are so uncertain that one wishes more equivocal phrasing had been used by the CLARKS. The "second brood" view was established apparently by Prof. SMYTH, but a check of his paper (*Ent. News,* vol. 11: pp. 465-468; 1900) shows that his only first brood pupae (1898) not only did not immediately emerge the same year, but in fact none emerged until the SECOND early spring (1900)!

A tantalizing sentence tucked into the preface (p.v) holds promise of another fine work still to appear: "We hope later to publish our detailed records, and also our notes on the habits and other attributes of the various species."

C. L. REMINGTON,
Osborn Zoological Lab., Yale University,
New Haven, Conn., U.S.A.

FIELD AND TECHNIQUE NOTES

NOTES ON COLLECTING *POLYGONIA*

To supplement Mr. BOCK'S article on collecting *Polygonia faunus smythi* Clark (*Lep. News*. vol. 5: p. 70), I would like to add some observations incurred during a collecting trip to the Great Smoky Mountain National Park between July 17 and 25, 1948. Thanks to Mr. ARTHUR STUPKE, then naturalist of the park, I had virtually complete freedom to hunt wherever I desired and consequently chose sites which varied in elevation. I found *P. smythi* commonest along the Appalachian trail between the Forney Ridge parking area on Clingman's Dome and Silers' Bald. This trail varies from 6643 to 5620 feet in elevation and crosses many small mountain streams. *P. smythi* would congregate in groups at the edge of the streams and sit individually on various precipices in the immediate vicinity. It was possible in this environment to collect as many specimens as one desired without unduly exerting oneself. I took twelve specimens from this area alone.

In other sections of the park, *P. smythi* could also be collected rather easily, but they became scarcer and livelier as the elevation decreased below 4000 feet. In back of the ranger station near the juncture of highways 71 and 73 at an elevation of less than 1000 feet, I saw and captured only one *P. smythi*.

This past August (17-20), 1951, I had the pleasure of accompanying Mr. & Mrs. LESLIE BANKS to the Ottawa National Forest in the upper peninsula of Michigan. Following a dirt road between rain showers, we collected four species of *Polygonia: interrogationis* Fabr., *comma* Harris, *faunus faunus* Edwards, and *progne* Cram., the latter two being the most common. Although we collected at the puddles in the road, the easiest collecting and also the most productive of females was at the flowers of Joe-Pye-Weed (*Eupatorium purpureum* L.) growing profusely at the edge of the road.

We were unable to make any elevation observations because of the uniformity of the terrain. Other species collected in the same manner were: *Nymphalis milberti* Godt., *N. j-album* Bdv. & Lec., *N. antiopa* L., and *Hesperia laurentina* Lym.

DAVID H. KISTNER, 5031 N. Kolmar Avenue, Chicago 30, Ill., U.S.A.

THE WEIGHTS OF FRESH AND DRIED BUTTERFLIES

A *Colias philodice* (Latr.) ♀ was caught on 17 October 1951, and placed in the cold store, where it died on 27 October. The wings were removed from the body, and wings and body were weighed separately, before and after they were dried in the warm basement, at 75°-80° F. The weights were as follows:

	Fresh (mg.)	Dry (mg.)	Difference	Loss (%)
Body	52.5	28.9	23.6	45
Wings	12.5	8.4	4.1	33
Total	65.0	37.3	27.7	42.6

A *Nymphalis milberti* (Latr.) which died on 27 November was found to have the following partition of weights:

Body	53.75	25.6	28.15	52.4
Wings	7.50	6.3	1.20	16.5
Total	61.25	31.9	29.35	48.0

Another *N. milberti* lost 44.0% moisture. It was found that the difference between drying the body at 75°-80° F. and 95° C. was only 7%; the wings weighed the same after both degrees of heat.

P. H. H. GRAY, Box 236, Macdonald College, Quebec, Canada

ERRATUM

Dr. P. H. H. GRAY has sent the following corrections to his paper "Resuts of humidity tests with *Papilio* pupae", *Lep. News*, vol. 5: p. 67; 1951.

Right column, 4th line: "The wing-radii of the bred ♀♀ are not" should be "The wing-radii of the bred ♀♀ are also".

Footnote: "one (B) did not emerge" should be "one (G) did not emerge".

THE NAMES OF CERTAIN BUTTERFLIES OF THE EASTERN UNITED STATES

by BRYANT MATHER

Two books of great value to the student of the butterflies of the eastern United States were published in 1951: *A Field Guide to the Butterflies of North America, East of the Great Plains* by ALEXANDER B. KLOTS (Houghton Mifflin Co., Boston), and "The Butterflies of Virginia" by AUSTIN H. CLARK and LEILA F. CLARK (*Smithsonian Miscellaneous Collections,* 116, no. 7, Washington). In some cases these works do not use the same names to designate the same butterflies. These differences are, in most cases, not such as to cause serious confusion; they are however annoying to one who would like to have a basis for selecting the best current usage in designating butterflies. A number of these differences were called to the attention of Mr. CLARK, Dr. KLOTS, and Mr. CYRIL F. DOS PASSOS in January 1952, and a series of communications and comments was elicited which are summarized below for the interest of others. It should be noted that, although this summary has been reviewed by those whose comments are included, and permission for its publication has been obtained, the opinions are given essentially as they were stated informally in letters and do not represent the explicit, fully documented discussions that would have been given had the contributors themselves prepared them for publication.

The differences may be considered in three groups: (1) those involving considerations of relationships and priorities to determine the "correct" name; (2) those involving the classification (*i.e.,* rank or grade) of a name, as between genera and subgenera or species and subspecies; and (3) those involving steps taken for improving or correcting the spelling. The comments given below have been sorted into these groups and are taken up in systematic order.

DIFFERENCES INVOLVING RELATIONSHIPS AND PRIORITY

(1) *Minois pegala* (Clarks, p. 32), *Cercyonis pegala* (Klots, p. 72): KLOTS used *Cercyonis* on the advice of R. L. CHERMOCK, an expert in the group; the CLARKS regard their use of *Minois* as an example of preferring "lumping"; DOS PASSOS has a letter from DE LESSE (15 January 1952) stating the belief that *Cercyonis* (type species *Papilio alope* Fab.) should be use for our Nearctic species, but DOS PASSOS feels that, since DE LESSE'S opinion is unpublished, the proper current usage would be *Minois* following the most recent check list (McDunnough, 1938).

(2) *Junonia evarete coenia* (Clarks, p. 45), *Precis lavinia coenia* (Klots, p. 108): KLOTS regards his use of *Precis* as an example of preferring "lumping" and cites HEMMING (*The Generic Names of the Holarctic Butterflies,* pp. 73-74) as follows: "The name *Junonia* Hb., though nomenclatorially valid, is not required, as *lavinia* Cram. is congeneric with *octavia* Cram., the type of *Precis* Hb., which has page priority." The CLARKS used *Junonia* following W. P. COMSTOCK but CLARK comments that perhaps *Precis* should have been used. DOS PASSOS regards *Precis* as probably preferable. The CLARKS again followed W. P. COMSTOCK in using *evarete* and CLARK notes that *Papilio lavinia* Cramer is preoccupied by *P. lavinia* Fabricius and that *P. evarete* is the oldest available name. DOS PASSOS notes that CORBET (1948, p. 54) uses *lavinia* and considers it conspecific with *Papilio* (*Nymphalis*) *orithya* Linnaeus, 1758, p. 473, and that as a result, the correct name would appear to be *Precis orithya evarete* (Cramer), apparently also following COMSTOCK (1942, p. 190) in discarding *Papilio lavinia* Fabricius, 1775, and using *Papilio evarete* Cramer, 1779.

(3) *Calephelis virginiensis* and *C. borealis* (Clarks, p. 69), *Lephelisca virginiensis* and *L. borealis* (Klots, p. 123): KLOTS' use of *Lephelisca* follows W. D. FIELD. CLARK states that when the genus *Calephelis* was established an oriental species was given as the type, but the authors made it perfectly clear that the genus was founded on (*C.*) *virginiensis* misidentified. He notes that an Opinion of the International Commission on Zoological Nomenclature states: "in the absence of indubitable proof to the contrary the species named shall be the type." He feels that the proof here is indubitable that what the authors had in mind was (*C.*) *virginiensis,* thus it becomes the type and the name *Lephelisca* has no standing. DOS PASSOS, on the other hand, after an investigation of the problem, has concluded that the correct name to use is *Nymphidia* Boisduval & Leconte (1833-1837), noting however that an application by WILBUR S. MCALPINE is pending before the International Commission to validate *Calephelis.*

(4) *Cyaniris argiolus* (Clarks, p. 73), *Lycaenopsis argiolus* (Klots, p. 169): DOS PASSOS notes that the type species of *Cyaniris* Dalman, 1816, is *argianus* Dalman, 1816 (=*Papilio semiargus* Rottenburg, 1775) and the type species of *Lycaenopsis* Felder & Felder, 1865, is *L. ananga* Felder & Felder, 1865. He notes that TUTT regarded neither of these as congeneric with *Papilio* (*Plebejus*) *argiolus* Linnaeus, 1758, p. 483, and hence proposed *Celastrina,* 1906, p. 131, for *argiolus.* DOS PASSOS concludes that it is certainly more correct is use *Celastrina* for the time being. KLOTS used *Lycaenopsis* since he regarded *Cyaniris* as inapplicable but followed others who feel that *ananga* and *argiolus* are congeneric.

(5) *Eupsyche m-album* (Clarks, p. 78), *Strymon m-album* (Klots, p. 133): KLOTS explains in his introductory comments on the Theclinae (p. 126) that he feels that it is necessary for the present to lump most of the species in one genus, in the absence of an adequate large-scale study. CLARK remarks that perhaps they should have used *Strymon,* but feels that it is a "convenient grab-bag" for a decidedly heterogeneous assemblage of hairstreaks. DOS PASSOS would prefer *Eupsyche* but feels it to be a matter of opinion.

(6) *Proteides clarus* (Clarks, p. 147), *Epargyreus clarus* (Klots, p. 206): Both the CLARKS and KLOTS explain their different choices as following BELL (!). DOS PASSOS indicates that the choice depends on whether *mercurius* (see Klots, p. 284) is congeneric with *clarus;* if so, then only one generic name is required and *Proteides* has line priority; if not, then the usage employed by KLOTS is proper.

(7) *Rhabdoides cellus* (Clarks, p. 149), *Autochton cellus* (Klots, p. 211): KLOTS follows BELL, the CLARKS use *Rhabdoides* as a matter of preference, DOS PASSOS notes that the type species of *Rhabdoides* is *Eudamus cellus* Boisduval and Leconte (?1837, pl. 73) and that the type of *Autochton* is *Autochton itylius* Hübner. The question is whether *itylius* and *cellus* are congeneric.

DIFFERENCES INVOLVING THE CLASSIFICATION OF NAMES

(1) *Zerene caesonia* (Clarks, p. 112), *Colias* (*Zerene*) *cesonia* (Klots, p. 189): CLARK regards *Zerene* as a separate genus from *Colias* on ecological and distributional grounds and feels that they are quite as distinct as some other genera in the Pieridae. KLOTS feels that *Zerene* is but a subgenus of *Colias* and refers to his discussion in *Entomologica Americana* 12:175 (1931). DOS PASSOS regards the question as a matter of opinion and suggests following MCDUNNOUGH (1938) which would give *Zerene* generic status.

(2) *Eurema jucunda* (Clarks, p. 117), *Eurema daira daira* summer form *jucunda* (Klots, p. 195): KLOTS believes that *daira,* 1819, and *jucunda,* 1833 are conspecific; he states in his book, however (p. 195): "Absolute proof of this will only be obtained by rearing a brood of one from two known parents of the other." The CLARKS found only typical *jucunda* in Virginia.

(3) *Battus philenor, Graphium marcellus* (Clarks, pp. 118, 145); *Papilio philenor, Papilio marcellus* (Klots, p. 179): KLOTS, in his book, (p. 171) refers to *Battus* and *Graphium* as subgenera, and regards the question as a matter of opinion. CLARK feels that *Battus, Graphium,* and *Papilio* are groups that differ from each

other in all stages much more than many universally accepted genera. DOS PASSOS prefers the CLARKS' usage and notes that it follows FORD'S recent revision of *Papilio.*

(4) *Atrytone alabamae* (Clarks, p. 174), *Atrytone dion alabamae* (Klots, p. 255): KLOTS considered *dion* and *alabamae* as conspecific, following LINDSEY, BELL, and WILLIAMS (1931, p. 117) who had before them only the male type and a single female of *alabamae,* both from Alabama. CLARK concludes that *alabamae* and *dion* are not conspecific after having compared a long series of *alabamae* from Virginia with the types of both *alabamae* and *dion* and considered various other factors such as time of flight and plant associations. DOS PASSOS observes that this question can only be solved by breeding but that the reasons given by Clark for his conclusion seem cogent.

DIFFERENCES INVOLVING SPELLING

(1) *Euptychia sosybius* and *Euptychia areolatus* (Clarks, pp. 38, 36), *Euptychia hermes sosybia* and *Euptychia areolata* (Klots, p. 69): In these two cases KLOTS has used *sosybia* and *areolata* so that the specific name will be of the same gender as the generic name.

(2) *Zerene caesonia* (Clarks, p. 112), *Colias (Zerene) cesonia* (Klots, p. 189): DOS PASSOS has explained that STOLL wrote the name *cesonia* in the Dutch and *sesonia* in the French text; most authors have emended *cesonia* to *caesonia* which is probably more classical Latin, but DOS PASSOS and KLOTS decided that the original spelling should be used in accordance with Article 19 of the *Règles.*

P.O. Drawer 2131, Jackson, Miss., U.S.A.

OBITUARIES

MARGUERITE S. FORSYTH

MARGUERITE SHEPARD (Mrs. LESLEY E.) FORSYTH of Florida City, Florida, died February 6, 1952, in North Haven, Connecticut, while visiting a sister. She was born August 28, 1889, in North Haven. In 1923 she and her husband and son moved to Florida. Her husband died in 1950; her son, WILLIAM H. FORSYTH 2D, is at present a resident of Miami.

Soon after arriving in Florida, Mrs FORSYTH began the collecting of Lepidoptera that was continued until poor health forced her to curtail activities in the late 1940's. Her work in southern Florida, and particularly in the upper Florida Keys, was of the greatest importance to science. The accuracy of her data and observations helped greatly to dispose of some of the deliberate falsifications which commercially minded collectors in tropical Florida had created by mislabelling tropical specimens. Her collecting during the period when so many of the famous localities in southern Florida were being wiped out by real estate developments, drainage and fires furnished many records now unobtainable.

Needless to say, Mrs. FORSYTH discovered many rarities. Two butterflies which she collected have been named after her: *Papilio polyxenes* ab. *forsythae* Wood and *Papilio cresphontes* ab. *forsythae* Gunder. She was, as

far as I know, the first person actually to take *Eurema daira palmira* Poey in Florida; and was very likely the last person to see the probably extinct *Eumaeus atala florida* Roeber. To her is also credited the discovery in Florida of *Eurema neda* Latreille. Her specimens have been widely dispersed by gift, exchange and sale. Many of them are in the major museums and other collections of North America.

My family and I came to know Mrs. FORSYTH well during our collecting trips in Florida and, like many other visitors there, will always cherish happy memories of her delightful and enthusiastic ways. Many a pleasant evening have we spent at her home, going over the day's catch, discussing field experiences, and learning much from her about the habits and phenology of the butterflies. In recent years, when physical infirmity forced her to forego much of the more strenuous butterfly collecting, more of her time was spent collecting and studying shells. In this, too, my daughter and I were happily able to join her; and on any evening it was a toss-up whether we would be going over butterfly material or hooking out *Liguus* snails that had been killed by leaving them in the freezing compartment of the FORSYTH refrigerator. Many of these rare Florida tree snails thus have eventually come to rest in the American Museum collection. Mrs. FORSYTH'S own shell collection will, it is believed, go to the University of Miami, as she wished.

ALEXANDER B. KLOTS,
American Museum of Natural History, New York, N. Y., U.S.A.

HENRY W. EUSTIS

Henry W. Eustis died unexpectedly in Augusta, Georgia, on October 6, 1951. He was born at Minneapolis, Minnesota, on December 6, 1877.

He was interested in collecting butterflies and moths and he being a perfectionist, his collection was beautifully mounted and given a great deal of care. The collection, consisting of representative United States Lepidoptera and some foreign butterflies, was housed in a small building in the side yard of his home in Augusta. The collection is being retained by Mrs. Eustis.

He had a deep love for music and was an excellent pianist. As a young man he sold a fine butterfly collection which he had assembled and used the proceeds to finance a year of music study in Berlin. Until his death he enjoyed playing for his own pleasure and often, upon his wife's urging, he would play selections from Chopin for their visitors.

He spent many years in the diplomatic service and was stationed in various European countries. He met and married Mrs. Eustis when he was stationed in Germany. Upon his retirement from government service they moved to Augusta where they could enjoy the mild winter climate and he could again pursue his hobby of butterfly collecting. During his years in Georgia, 1939-1951, he made several important "finds", including *Amblyscirtes belli* H. A. Freeman, extending the known range of this skipper far to the east.

LUCIEN HARRIS, JR., P. O. Box 167, Avondale Estates, Georgia, U.S.A.

PERSONALIA

IAN F. B. COMMON, until recently Technical Secretary of the Division of Entomology, Council for Scientific and Industrial Research, Canberra, Australia, has returned to full-time research as a Senior Research Officer in the Division. He is working on the taxonomy of Tortricidae and the biology, including adult behavior and migration, of Australian Noctuidae.

PETER F. BELLINGER, Associate Editor of *The Lepidopterists' News,* finished his graduate studies at Yale University in June and has accepted an appointment at the University College in Kingston, Jamaica. Dr. BELLINGER expects to take up certain work with Jamaican Lepidoptera and to extend his studies of Collembola systematics and biology to the Jamaican fauna. He and Dr. G. W. RAWSON returned in August after spending several weeks doing entomological field work in northern Alaska for Yale University. The resultant collections will be placed in Yale's Peabody Museum.

Prof. ALEXANDER B. KLOTS also spent much of the summer in field work in the Arctic of Canada, as did PAUL R. EHRLICH. Mr. EHRLICH was on Southhampton Island in northern Hudson Bay. Prof. KLOTS was apparently farther to the south and west.

S. G. KIRIAKOFF, of the University of Ghent, Belgium, is now working on the Ctenuchidae and Thyretidae of the Belgian Congo Museum, Tervuren, Belgium, with a monograph of these families in prospect. M. KIRIAKOFF is now a member of the board of the Société Entomologique de Belgique and has recently been made a Foreign Member of the Nederlandsche Entomologische Vereeniging.

It is with sincere personal regret that I must report the recent passing of two editors of lepidopterological periodicals.

On 26 April 1952 Dr. ROBERT LOELIGER died at the age of sixty-six at Zürich, Switzerland. He was the leader of the *Groupe d' Observation des Migrations de Papillons* and he issued regular circulars reporting to the hundreds of "collaborateurs" the results of their migration observations. Readers of the *News* will recall his article describing the work of the group *(Lep. News,* vol. 4:pp. 61-62; 1951). Shortly before his passing he had to be hospitalized for a serious operation. On 3 April he wrote the *Groupe d' Observation:* "Je m'excuse de vous adresser aujourd'hui un message d'ordre personnel. Devant subir immédiatement une intervention chirurgicale, qui va m'interdire toute activité pendant assez longtemps....J'espère viviment que tout cela passera plus vite qu'on ne le prévoit actuellement. Comme je suis seul à liquider toute la correspondence, il y aura cependant un trouble sensible et inevitable dans notre organisation. Je vous demande donc compréhension et patience." Unhappily, "all this passed" all too quickly. No word has been received concerning the continuance of the *Groupe.*

Mrs. EVELYN GILSTRAP WILLIAMS was killed around New Year's Day in an automobile accident near Beatty, Nevada, while returning from Arizona to her home in North San Juan, California. Mrs. WILLIAMS established the Howell Mountain Butterfly Club (later the Moth and Butterfly Club) about seven years ago and issued a mimeographed periodical to the members. It appeared regularly each month for the six years of her editorship. She carefully keyed its content to the interests of beginners and very young lepidopterists. Another member of The Lepidopterists' Society has undertaken to continue the periodical, *Notes on Moths and Butterflies.* Dues for 1952 are $1.50 and will be accepted by the new editor:

Mr. JAMES M. UNSELD, JR., Gravel Switch, Kentucky, U. S. A.

C. L. REMINGTON

BOOK REVIEWS

AN ANNOTATED CHECK LIST OF THE MACROLEPIDOPTERA OF BRITISH COLUMBIA. By J. R. J. Llewellyn Jones. The Entomological Society Of B. C. Occasional Paper No. 1: 148 pp. Issued June 14, 1951. Price: $1.00 (address of Society Secretary: P. O. Box 210, Kamloops, B. C. Canada).

Intended primarily as a revision of BLACKMORE'S List (1927) the list now includes approximate season of flight of each species and host plants where data on these was available. All recent changes in nomenclature have been incorporated, also the check list numbers from MCDUNNOUGH'S "Check List of the Lepidoptera of Canada and the U. S. A". Distribution of each species within B. C. is given.

No great amount of collecting has been done in B. C. since the issuance of the original list, and most of the new records are from the author's collection, consisting entirely of southern Vancouver Island material, and from the collection of Dr. W. R. BUCKELL made at Shushwap Lake.

"Popular" names have been assigned to nearly every species, subspecies, and form. It cannot be said that this has added anything to the value of the work. There is at present among North American entomologists a general lack of interest in vernacular names, and this trend can hardly be considered undesirable. Such names, when of less than specific value, are particularly cumbersome.

It should be noted that the food plant records must be used with caution. Such information, in order to attain reasonable accuracy, must be based on a great mass of data gathered from every locality in the area covered. It has proved nearly impossible for Mr. JONES to obtain such data, so of necessity many of the host plant records are based on the author's own observations of material collected in a restricted area. However, if only as a guide to what plants are worth trying, this innovation is bound to prove useful to those interested in rearing Lepidoptera.

The number of species, broken down into superfamilies, included in JONES' new list of B. C. Macrolepidoptera is approximately as follows: Papilionoidea 130; Hesperioidea 24; Sphingoidea 17; Saturnioidea 5; Noctuoidea 530; Bombycoidea 6; Drepanoidea 10; Geometroidea 308; total — 1030. BOWMAN'S List of Alberta Lepidoptera gives about 1500 species. About 130 are butterflies, approximately 40% Microlepidoptera. This, as far as it goes, indicates an almost exact parallel with the B. C. List.

The typesetting has been very carelessly done, so the errata and addenda pages should be carefully studied.

In spite of minor shortcomings, this list is certain to prove popular with collectors. It must be remembered that the author undertook an extremely onerous assignment in preparing an annotated catalogue, in place of the usual straight list. As a result, the book will always be useful as a guide to where and when to go for any species desired. Similiar books covering every section of the continent would not come amiss.

RICHARD GUPPY, R. R. 1, Marine Drive, Wellington, V. I., B. C., Canada

DIE SCHMETTERLINGE MITTELEUROPAS. By Walter Forster & Theodor A. Wohlfahrt. [In German.] [First instalments], vol. 1, viii + 32 pp., 18 figs.; vol. 2, 32 pp., 4 pls., 13 figs. Stuttgart, 1952. Publisher: Franckh'sche Verlagshandlung, W. Keller & Co., Stuttgart, Germany. Subscription price of the first instalments of vols. 1 and 2 is DM. 10. There will be 5 more instalments of vol. 1 totaling 256 pp., and vol. 2, totaling 128 pp., 27 pls., bringing the total presubscription price to DM. 60. After subscription period closes the price for vols. 1 and 2 complete, bound, will be DM. 76.

This excellent work, well-illustrated with colored figures, on the butterflies and moths of central Europe, will be a "must" to all European collectors, and to many Americans who are interested in the world-wide relationship of these insects. To one

who collected last summer in the Dolomites in Italy, the Alps of Switzerland, as well as in France, the usefulness of this work is beyond estimation.

Dr. FORSTER and Prof. Dr. WOHLFAHRT are well qualified to write on the Lepidoptera. In the first part of their treatise, they have given an outline of the equipment needed by a collector for the purpose of catching, killing, rearing and preparing these insects, including the larvae. The first volume will deal also with a number of subjects including the structure and evolution of Lepidoptera, their ecology, enemies, parasites, diseases, economic value, genetics, systematics and nomenclature, geographical distribution, phylogeny, etc.

The second part commences the treatment of the diurnal Lepidoptera, starting with Papilionidae, continuing with Pieridae, and takes one part way through Satyridae (*Erebia*). The text figures are mostly of the venation, with a few of the genital armature. The 4 plates, from water colors by Prof. Dr. WOHLFAHRT, that accompany this part, contain 73 beautiful, life-size figures, ending with *Colias*. These figures are well arranged for comparative purposes, and the explanation of the plates shows when and where each specimen was taken. In the text a section is devoted to each species (with the popular German name), within which the particular subspecies occurring in central Europe is described and brief reference made to the larva and pupa. No reference to original descriptions or other bibliographical information is given here. Apparently these will follow near the end of vol. 1. Some generic characters for the imago, larva and pupa are included. The work should prove especially valuable to all collectors and students for the easy and rapid determination of their specimens.

Vols. 3, 260 pp., 30 pls.; 4, 400 pp., 30 pls., and 5, 320 pp., 30 pl., will be published in 1954, 1956, and 1958 respectively, all devoted to the moths, but the subscription prices therefor cannot be estimated at this time.

C. F. DOS PASSOS, Washington Corners, Mendham, New Jersey, U. S. A.

DE PLAGEN VAN DE CULTUURGEWASSEN IN INDONESIË, L. G. E. Kalshoven, with cooperation of H. J. V. Sody (Mammals) and A. C. V. van Bemmel (Birds). Vol. 2: pp. 513-1065, figs. 229-599, pls. X-XVI. Published 1951 by W. van Hoeve, The Hague, Netherlands. Price: 39.50 Dutch guilders.

The first volume of this excellent handbook (in Dutch) on the pests of the cultivated plant crops in Indonesie has been reviewed on page 50, vol. 4, of the *News*. The second volume is as beautifully executed and illustrated, and contains also an appendix: "English translation of the text for illustrations", pp. 1-14. On pages 523-658 the remaining families of Lepidoptera are treated, viz. Zygaenidae, Drepanidae, Geometridae, Lasiocampidae, Eupterotidae, Notodontidae, Bombycidae, Saturniidae, Arctiidae, Asotidae, Agaristidae, Noctuidae, Lymantriidae, Sphingidae, and Rhopalocera. Life history of many species, injury to crops, etc. are illustrated with figs. 229-389, and larvae and pupae of more important Lepidopterous pests are depicted on the nice coloured Plate IX. Furthermore the remaining insect orders, viz. Diptera and Hymenoptera are treated, and followed by Amphibia, Reptiles, Birds, and Mammalia. A general index to both volumes is enclosed.

Hardly having finished with this monumental work Dr. KALSHOVEN has started preparation of another handbook: on the Forest Insects of Indonesia.

A. DIAKONOFF, Rijkmuseum van Natuurlijke Historie, Leiden, Netherlands

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [G.dL.] - G. DE LATTIN; [Y.O.] - Y. OKADA; [C.R.] - C. L. REMINGTON; [T.S.] - T. SHIRÔZU. **A complete set of these pages, for clipping and filing, may be obtained for Vol. 4 and Vol. 5 and a subscription for Vol. 6 for $ 0.50 per volume.**

A. GENERAL WORKS

Döring, E., *Byfaltera. Aus dem Leben der Schmetterlinge* [in German]. 120 pp., 2 pls. 1949. [Not seen]

Nolte, H. W., *Der Kohlweissling. Aus dem Leben eines Tagfalters* [in German]. Brehm-Bücherei. 43 pp., figs. 1949. [Not seen]

dos Passos, C. F., "On the present trend of the American lepidopterology" [translated into Japanese]. *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 1: pp. 40-41. 1950.

Warren, B. C. S., "On the present trend of the British lepidopterology" [translated into Japanese]. *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 2: pp. 6-8. 1951.

B. SYSTEMATICS AND NOMENCLATURE

Ferreira d'Almeida, R., "Nota rectificativa e adicional sobre algunos tipos de generos e sobre a nomenclatura de alguns grupos superiores publicados por nós em 1942, 1943 e 1944" [In Portuguese]. *Revista Ent.*, vol. 21: pp. 223-224. [10] Aug. 1950. Corrections to several earlier papers. *Platysamia* a synonym of *Hyalophora; Synchloe* and *Tatochila* are valid genera (the latter for 'a group of American species'). Several notes on generotypes (Pieridae, Mimallonidae, Mechanitidae). [P.B.]

Bradley, J. D., "On the occurrence of *Tinea columbariella* Wocke (Lep. Tineidae) in England, with a description of the species." *Entomologist,* vol. 83: pp. 169-172, 4 figs. Aug. 1950.

Dasse, G., "Genitalia de Cuculliinae (Agrotidae)" [in French]. *Lambillionea,* vol. 49: pp. 127-128, 1 pl. 25 Dec. 1949. Figures ♂ genitalia of 6 Belgian spp. of *Cucullia.* [P.B.]

Diakonoff, A., "De genusnaam *Enarmonia* Hübn. versus *Ernarmonia* (Microlepidoptera, Eucosmidae)" (in Dutch). *Verslag 106e Zomervergadering Ned. Ent. Vereniging:* pp. LXII-LXIII. 15 May 1952.

Diakonoff, A., "Notes on cave-dwelling Microlepidoptera with description of a new genus and species from East Java (family Oinophilidae)." *Zool. Mededelingen,* vol. 31: pp. 129-137, figs. 1-7. 20 Dec. 1951. Describes *WEGNERIA* gen. nov., with type: *cavernicola* spec. nov. [A.D.]

Diakonoff, A., "Records and descriptions of Microlepidoptera (5)". *Zool. Mededelingen,* vol. 31: pp. 165-178, figs. 1-12. 11 Feb. 1952. Separates a new Tortricoid family SCHOENOTENIDAE, type genus: *Schoenotenes* Meyrick; discusses affinities, gives key to genera and describes four new species of *Diactenis: thauma, sequax, plumula,* and *isotima* (type locality: East Java). [A.D.]

Ferguson, Douglas C., "Collecting a little-known Papilio." *Lep. News,* vol. 4: pp. 11-12. [May] 1950.

Herbulot, C., "Sur la détermination des *Agdistis*" [in French]. *Lambillionea,* vol. 50: pp. 16-19, 1 pl. 25 Feb. 1950. Figures ♂ 8th sternite of 11 spp. Notes on several spp. of uncertain identity. [P.B.]

Hoffman, Emil, "Priorität-Continuität" [in German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 106-108. 30 June 1947. Discusses instability of scientific names, with examples from the Lepidoptera. [P.B.]

Janmoulle, E., "Genitalia de Tineinae" [in French]. *Lambillionea,* vol. 49: pp. 87-88, 1 pl. 25 Aug. 1949. Figures ♂ genitalia of *Tineola biselliella* and of 8 Belgian spp. of *Tinea.* [P.B.]

Kirkwood, Carl W., "A new moth of the genus *Apicia* from Arizona." *Bull. So. Calif. Acad. Sci.,* vol. 50: pp. 99-100, 1 fig. "May-Aug." [15 Oct.] 1951. Describes as new *A. graceiaria* (Madera Canyon, Santa Rita Mts., Ariz.); figures both sexes. Genitalia not mentioned, sp. not compared with others. [P.B.]

de Laever, E., "Genitalia d'Hesperiidae" [in French]. *Lambillionea,* vol. 50: pp. 43-44, 1 pl. 25 Apr. 1950. Figures ♂ genitalia of 4 spp. of *Pyrgus* (subg. *Secloptrix*). [P.B.]

de Lesse, H., "Forme nouvelle d'un *Coenonympha* du Forez" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 152-154, 4 figs. "Sept.-Oct. 1949" [25 Jan. 1950]. Describes as new *C. arcania lecerfi* (Forez). [P.B.]

Martin, Edward L., "*Homoeosoma ravonella* and *bentinckella* Pierce." *Entomologist,* vol. 84: p. 142. June 1951. In the original description (*Ent.* 70: p. 103) figs. of ♂ genitalia of these 2 spp. reversed. [P.B.]

Nakahara, Waro, "New or imperfectly known Japanese butterflies" *Butt. and Moths* (*Trans. Lep. Soc. Japan*), vol. 2: pp. 2-3. 1951. Describes as new: *Artopoëtes pryeri yezoensis* (Hokkaido, Japan); *Halpe varia obscura* (Shinano, Japan). Notes on *Neozephyrus taxila regina* and *Halpe varia varia.* [Y.O.]

Obraztsov, Nicholas, "On the correct name of the family Phaloniidae (Lepidoptera)." *Ent. News,* vol. 61: p. 198. Nov. 1950. Should be Agapetidae. [P.B.]

Okada, Yoshio, "Genus *Zerynthia* Ochsenheimer" [In Japanese]. *Butt. and Moths* (*Trans. Lep. Soc. Japan*),vol. 2: pp. 4-5. 1951. 3 spp. discussed and their genitalia figured. [Y.O.]

Okagaki, Hiromu, "Notes on the genetic name of so-called *Euchloë*-species from Japan (Pieridae)" [In Japanese, English summary]. *Butt. and Moths* (*Trans. Lep. Soc. Japan*), vol. 1: pp. 35-37. 1950. *Scolymus* does not belong to *Falcapica,* and the correct generic name for *cardamines* and *scolymus* is *Anthocharis.* With genitalic figs. [Y.O.]

Paclt, J., "Proposed suspension of the Règles for two nomina nuda of (Denis & Schiffermüller) (Lep. Satyridae)". *Ent. Berichten,* vol. 14: pp. 91-92. 1 June 1952.

Rosier, J. P., "A new *Charaxes* from Java." *Idea,* vol. 9: pp. 24-26, figs. 31 Dec. 1951. Discusses occurrence of two subspp. of *Charaxes baya* (Moore) in Java. [A.D.]

Slabý, Otto, "*Cidaria flavicinctata* Hbn. ex Slovakia (Lep. Geometridae)" [in Czech, Latin summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 46: pp. 170-172, 4 figs. 1 Oct. 1949. Figures ♂ genitalia, and those of *C. caesiata.* [P.B.]

Viette, P., "Contribution à l'étude des Hepialidae (6ᵉ note). Description des genitalia de quelques espèces paléarctiques" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 83-87, 1 pl. "Mar.-Apr." [4 Oct.] 1949. Describes and figures ♂ genitalia of *Alphus amasinus, A. laetus, Korscheltellus nebulosus, K. variabilis, K. armoricanus, K. aemilianus.* Key to 3 spp. of *Alphus.* [P.B.]

Viette, P., "Les Noctuidae Noctuinae (Lep.) de la Nouvelle Calédonie et des Nouvelles Hébrides" [in French]. *Ann. Soc. Ent. France,* vol. 118: pp. 29-50, 38 figs. 1951. Describes as new: *Hypospila tamsi; Oxyodes ochreata novaehebridensis* (both from New Hebrides). Detailed descriptions of 10 spp. belonging to as many genera, with figures of ♂ and ♀ genitalia; key to the 12 genera occurring in this area (the other two were covered in an earlier paper). [P.B.]

Viette, P., "Les types de Tinéides Meyrick appartenant au Muséum de Paris (Lep.)" [in French]. *Bull. Soc. Ent. France,* vol. 56: pp. 81-90. 1951. Lists holotypes or lectotypes, with type locality and original reference, of 182 of Meyrick's spp., belonging to 20 families. [P.B.]

Warren, B. C. S., "*Erebia semo* Grum Grshimailo: a species distinct from *Erebia fasciata* Butler (Lepidoptera, Satyridae)." *Entomologist,* vol. 84: pp. 73-77. Apr. 1951. Separation based on genitalia and characters of androconia. [P.B.]

Warren, B. C. S., "On a *Boloria* recorded from Abisko (Lep., Nymphalidae)." *Entomologist,* vol. 84: pp. 169-171. Aug. 1951. Comments on *B. 'lapponica',* a non-existent species; the name is usually misapplied to *B. pales aquilonaris* or *B. napaea.* [P.B.]

C. MORPHOLOGY AND CYTOLOGY

Bryk, Felix, "Über die Plethopterygie bei den Schmetterlingen" [in German]. *Proc. VIII Int. Ent. Congr.*, pp. 541-543. 1950. Remarks on supernumerary wings in some Lepidoptera. [P.B.]

Cazal, Pierre, "Les glandes endocrines rétro-cérébrales des insectes" [in French]. *Thèses Faculté Sci. Univ. Paris, ser. A.* no 2229: 227 pp., 186 figs. 1948. Describes morphology and cytology of this system in insects, including Lepidoptera. [P.B.]

Diakonoff, A., "Een merkwaardig orgaan bij zekere Tortriciden" [in Dutch: A remarkable organ in some T.]. *Verslag 106e Zomervergadering Ned. Ent. Vereniging*: pp. LX-LXII. 15 May 1952.

Kiriakoff, S. G., "Recherches sur les Organs tympaniques des Lépidoptères en rapport avec la classification" [in French]. *Ent. Berichten*, vol. 13: pp. 381-382. 1 Dec. 1951. Describes the tympanal organ of Cocytiidae (*Cocytia durvillii*). [A.D.]

Miya, Keiichira, "Studies on the development of gonad of the silkworm, *Bombyx mori* L. I. On the region and period of differentiation of germ cells" [in Japanese, English summary]. *Trans. Sapporo Nat. Hist. Soc.*, vol. 19: pp. 36-39, 2 figs. Aug. 1950.

Narbel-Hofstetter, Marguerite, "La cytologie de la parthogénèse chez *Solenobia* sp. (*lichenella* L.?) (Lépidoptères, Psychides)" [in French]. *Chromosoma*, vol. 4: pp. 56-90, 51 figs. 1950. Description of maturation divisions in a tetraploid psychid with a variable chromosome number (118-126). [P.B.]

Okada, Yoshio, "Asymmetric genitalia of *Troides aeacus* Felder (Papilionidae)." *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 1: p. 29. 1949. Describes and figures asymmetric male genitalia of *T. aeacus* from Formosa and discusses its systematic meaning. [Y.O.]

Shteinberg, D.M., "Formoo'razovatel'nye vozmozhnosti gipodermy pri razvitiĭ krylau voshchinnoi moli (*Galleria mellonella* L.)" [in Russian; Morphogenetic possibilities of the hypodermis in the development of the wing of *Galleria*]. *Isvest. Akad. Nauk SSSR, Ser. Biol., 1949*: pp. 340-374.

Slabý, Otto, "The copulatory organs of a gynandromorphous *Argynnis paphia* L. and discussion about its development" [in Czech, English summary]. *Acta Soc. Ent. Čechosloveniae*, vol. 47: pp. 81-95, 19 figs. 1 Oct. 1950. Describes and figures genitalia and speculates on embryological origin. [P.B.]

D. VARIATION AND GENETICS

Christl, Otto, "Stachelbildung an Puppen von *Pieris brassicae* L." [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 95-96. 30 June 1947. Records presence of paired spines on 2nd abdominal tergite in one reared family. [P.B.]

Hata, Yoshihiko, "On a gynandromorph of *Papilio bianor dehaani.*" *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 1: p. 30. 1949. Describes and figures a bilateral gynander from Japan. [Y.O.]

Komárek, Oldřich, "*Chrysophanus dorilis* Hufn, ab. *vilmae* n. ab. (Lep. Lyc.)" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae*, vol. 46: pp. 149-150. 1 Oct. 1949.

Loritz, Jean, "*Minucia lunaris* Schiff., aberratio *inoperta*, forma nova" [in French & German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 93-95, 2 figs. 30 June 1947.

Marten, Werner, "Neues über *Ocnogyna latreillei* Godt. (Lep., Arctiidae)" [in German]. *Zeits. Lepidopt.*, vol. 1: pp. 53-55, 1 fig. 1 May 1950. Notes on attraction of other spp. by ♀. Describes and names a probable genetic form. [P.B.]

Obraztsov, N., "Au sujet de la variabilité de *Peronea hippophaeana* Heyd." [in French]. *Rev. Franç. Lépid.*, vol. 12: pp. 88-93. "Mar.-Apr." [4 Oct.] 1949. Redescribes 11 aberrations, with synonymy. [P.B.]

Okada, Yoshio, "On a gynandromorph of *Papilio thaiwanus* Rothschild." *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 1: p. 30. 1949. Describes and figures a partial gynander from Formosa. [Y.O.]

Querner, Hans, "Untersuchung über die Flugelform der Mehlmotte *Ephestia kühniella* Z., insbesondere den Faktor *kfl* (kurzflugelig)" [in German, summaries in English, French, and Russian]. *Biol. Zbl.*, vol. 67: pp. 293-319, 14 figs. 1948. Analysis of growth factors affecting wing size and proportions. [P.B.]

Réal, P., "*Argynnis euphrosine* L. ab. *dovensis* nova" [in French]. *Rev. Franç. Lépid.,* vol. 12: p. 214. "Jan.-Feb." [12 July] 1950.

Reichl, E., "Zur Genetik einiger Formen von *Syntomis phegea* L. (Lep., Syntomidae)" [in German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 83-88. 1 Aug. 1951. Determines one "form" as sex-controlled mutant and two as non-genetic [P.B.]

Sevastopulo, D. G., "Brownish-yellow forms of *Papilio demoleus.*" *Journ. Bombay Nat. Hist. Soc.,* vol. 49: pp. 569-570. Dec. 1950.

Sevastopulo, D. G., "Seasonal forms of *Catopsilia* spp." *Journ. Bombay Nat. Hist. Soc.,* vol. 49: p. 570. Dec. 1950.

Sieder, Leo, "Nachtrag zu: *Psychidea bombycella* var. *noricella* (var. nova)" [in German]. *Z. Wiener Ent. Ges.,* vol. 57: p. 62. 30 June 1947.

Zeman, J., "*Pieris napi L.* hermaphrod." [in Czech]. *Acta Soc. Ent. Čechosloveniae,* vol. 46: pp. 184-185, 1 fig. 1 Oct. 1949. Describes and figures "hermaphrodite". [P.B.]

E. DISTRIBUTION AND PHENOLOGY

Adamczewski, Stanisłáw, "Notes on the mining Lepidoptera of central Poland" [in Polish, English summary]. *Fragm. Faun. Mus. Zool. Polonici,* vol. 6: pp. 11-33. 19 Oct. 1949. Annotated list of 163 spp.

Albers, Theodor, "Über Veranderungen in der Zusammensetzung der Grossschmetterlingsfauna des Gebietes von Gross-Hamburg" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.,* n.s., vol. 4: pp. 29-36. 1951. Discusses recent changes in the local fauna and the causes of disappearance of some spp. [P.B.]

Bellet, H., "Nouvelle localité de *Araschnia levana* L. dans la Vienne" [in French]. *Lambillionea,* vol. 49: pp. 118-119. 25 Dec. 1949.

Bentinck, G. A., "Nieuwe en zeldzame Lepidoptera in 1950". [In Dutch: New and rare L. in 1950]. *Verslag 83e Wintervergadering Nederl. Entom. Vereeniging*: pp. XXII - XXIV. 1 Feb. 1952. Gives a list of interesting captures; reports nine species as new for the Netherlands fauna. [A.D.]

Burman, Karl, "*Nothris obscuripennis* Frey in Nordtirol (Lep., Gelechiidae)" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 31-34. 1 May 1950.

Cardoso, Aldo, "Lepidópteros de Alagoas" [in Portugese]. *Revista Ent.,* vol. 20: pp. 427-436. [31 Aug.] 1949. Annotated list; butterflies and macroheterocera (except Noctuidae and Geometridae). [P.B.]

Chin-jen, Luh, "A list of recorded species of Cochlidionidae (Lepidoptera) of China." *Peking Nat. Hist. Bull.,* vol. 16: pp. 91-190. "Dec. 1941" [Apr. 1948]. Records of 97 spp. [P.B.]

Garth, John S., "Butterflies of Grand Canyon National Park." *Grand Canyon Nat. Hist. Ass. Bull.* no. 11: 52 pp., 25 figs., 1 map. Sept. 1950. See review in *Lep. News,* vol. 5: p. 61.

Gobert, J.-E., "*Isturgia carbonaria* 61. en Dauphiné" [in French]. *Rev. Franç. Lépid.,* vol. 12: p. 96. "Mar.-Apr." [4 Oct.] 1949.

Gozmány, Lancelot A., "A survey of the helophilous macro-moths of the Hungarian highlands." *Lep. News,* vol. 2: pp. 93-94. Nov. 1948.

Gozmány, L. A., "Hungarian lepidopterology. II. The Lepidoptera fauna of the Carpathian Basin." *Lep. News,* vol. 3: pp. 75-76. "Oct." [Nov.] 1949.

Kobayashi, Keisuke, "On *Anua tirhaca separans* (Noct.) newly-recorded for Japan" [in Japanese]. *Butt. and Moths (Trans. Lep. Soc. Japan),* vol. 1: pp. 27-28. 1949.

Levý, Josef, "Contributio ad cognostionem lepidopterorum Bohemiae meridionalis" [in Czech, Latin summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 45: pp. 78-89, 156-161. 1 May, 1 Oct. 1948. Annotated list; 24 spp. are new for area. [P.B.]

F. BIOLOGY AND IMMATURE STAGES

Alfaro, Agustin, "Orugas de *Archips* en el arbolado frutal de la Ribera del Jalón" [in Spanish]. *Bol. Patol. Veg. Ent. Agric.,* vol. 17: pp. 37-59, 22 figs. 1950. Morphology, biology, control of *A. crataegana, A. xylosteana, A. rosana;* all stages figured. [P.B.]

Allan, P. B. M., *Larval foodplants; a vade mecum for the field lepidopterist.* 126 pp. London: Watkins and Doncaster. 1949. Lists recorded food plants of all native British macrolepidoptera and of some immigrant spp. [P.B.]

Andersen, F. Sogaard, "Preliminary observations on the moth *Endrosis sarcitrella*" [in Danish, English summary]. *Ann. Rep. Pest Infestation Lab. Denmark,* 1948-49: pp. 21-24. 1949. Culture methods, humidity relations. [P.B.]

Arbuthnot, K. D., "Status of European Corn Borer Parasites in the United States." *Journ. Econ. Ent.,* vol. 43: pp. 422-426, 3 figs. Aug. 1950.

Beckham, Clifford Myron, "Biology of the Spotted Tentiform Leaf Miner, *Lithocolletis crataegella,* on Apple." *Ohio State U. Abs. Theses Master's Degree,* no. 55: pp. 19-20. 1948.

Brooks, Maurice, "Starlings, *Sturnus vulgaris,* Eating Monarch Butterflies." *Auk,* vol. 69: p. 89. Jan. 1952. Records three instances of Starlings catching and eating *Danaus* in West Virginia. [C.R.]

Carter, W. A. C., "Parasites of *Limenitis camilla* and *Euphydryas aurinia.*" *Entomologist,* vol. 84: p. 207. Sept. 1951. Records *Apanteles gonopterygii* from both. [P.B.]

Munroe, Eugene G., "Subventral tubercles of saturnioid Larvae - a supplementary note." *Ent. News,* vol. 61: pp. 39-40. Apr. 1950. Previous article see *Lep. News,* vol. 3, abs. no. 180. [P.B.]

Sarlet, L., "Oeufs de Pieridae" [in French]. *Lambillionea,* vol. 49: p. 108, 2 pls. 25 Oct. 1949. Figures eggs of 11 Belgian spp. [P.B.]

Sarlet, L., "Oeufs de Lycaenidae" [in French]. *Lambillionea,* vol. 50: pp. 19-20, 1 pl. 25 Feb. 1950. Figures eggs of 5 spp. of *Lycaena* and 4 of *Maculinea.* [P.B.]

Sarlet, L., "Oeufs de Satyridae et de Nymphalidae" [in French]. *Lambillionea,* vol. 50: p. 60, 1 pl. 25 June 1950. Figures eggs of 4 Satyridae, 4 *Melitaea,* and *Argynnis ino.* [P.B.]

Stellwaag, F., "Der Heu- und Sauerwurm (*Clysia ambiguella* Hübn. und *Polychrosis botrana* Schiff.)" [in German]. *Flgbl. Biol. Zentralans. Braunschweig,* no. L10: 8 pp., 8 figs. July 1949. Biology and control. [P.B.]

Strawinski, Konstanty, "The insects observed in the medicinal herbs in the Lublin province" [in Polish, English summary]. *Ann. Univ. Mariae Curie-Skłodowska,* sect. E, vol. 3: pp. 289-345. 1948. Records 17 Lepidoptera. [P.B.]

Thompson, W. R., *A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Parts 6-9. Parasites of the Lepidoptera.* v + 627 pp. *Part 10. Index of parasites of the Lepidoptera.* 107 pp. Ottawa: Commonwealth Bureau of Biological Control. 1944-1950. Lists Lepidoptera alphabetically by genus and species and records for each the known parasites, the area where found, and references. [P.B.]

Troníček, Edward, "Contribution pour l'oecologie du *Carcharodus alceae* Esp. (Lep. Hesper.)" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 45: pp. 98-100. 1 May 1948. Larval habits. [P.B.]

Wood, G. W., "An annotated list of lepidopterous larvae from commercial blueberry fields, Charlotte County, N. B." *Canad. Ent.,* vol. 83: pp. 241-244. Sept. 1951. Lists 19 Noctuidae, 12 Geometridae, 1 pierid, 4 Tortricidae, 1 tineid, 1 gelechiid; lists parasites reared. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Beck, Stanley D., "Nutrition of the European Corn Borer, *Pyrausta nubilalis* (Hbn.). II. some effects of diet on larval growth characteristics." *Physiol. Zool.,* vol. 23: pp. 353-361, 3 figs. Oct. 1950. Denies the fundamental validity of Dyar's rule. [P.B.]

Koller, Gottfried, "Rhythmische Bewegung und hormonale Steuerung bei den Malpighischen Gefässen der Insekten" [in German, summaries in English, French, and Russian]. *Biol. Zbl.,* vol. 67: pp. 201-211, 3 figs. 1948. Rhythmic movements of Malpighian tubules found in many insects, but not in the 6 Lepidoptera studied. [P.B.]

Komárek, Oldřich, "Contribution aux connaissances écologiques de *Limenitis populi* L." [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 168-177, 2 figs. 1 Oct. 1950. Discusses effect of microclimate on habits: *L. populi* flies high after rain, but approaches or rests on the ground after prolonged dry spells. [P.B.]

Punt, A., "The respiration of insects." *Physiol. Comp. Oecol.,* vol. 2: pp. 59-63, 19 figs. 1950. Continuous photographic recording method shows that CO_2 production may be constant or periodic (in bursts) in various insects. Species tested were mostly Lepidoptera. [P.B.]

Schwartz, Viktor, "Wirkungen der Luftfeuchtigkeit auf die Entwicklung und Vitalität bei *Ephestia kühniella* Z." [in German, summaries in English, French, and Russian]. *Biol. Zbl.,* vol. 67: pp. 562-574, 4 figs. 1948. Dryness affects adversely the vitality of the moths, particularly of the mutant *be.* [P.B.]

Troníček, Edward, "Sur le mouvement des papillons éclos, spécialement de l'espèce *Brachionycha nubeculosa* Esp." [in Czech, French abstract]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 186-192. 1 Oct. 1950. Describes and discusses characteristic movements of newly emerged adults, which appear to seek the sunlight (probably an instinct permitting more rapid hardening af the wings). [P.B.]

H. MIGRATION

Hanson, B., "Om baklanges flykt hos *Gonepteryx rhamni* L. (Lep.)" [in Swedish]. *Ent. Tidskr.,* vol. 71: pp. 223-224, 1 fig. 31 Dec. 1950. Migration.

Muspratt, V., "A propos de *Colias hyale*" [in French]. *Rev. Franç. Lépid.,* vol. 11: pp. 363-364. Sept. 1948. Migration; spring generation. [P.B.]

Muspratt, V., "*Colias alfacariensis* Ribbe n'est pas toujours sédentaire" [in French]. *Rev. Franç. Lépid.,* vol. 12: p. 94. "Mar.-Apr." [4 Oct.] 1949. Said to migrate to England with *C. hyale.* [P.B.]

Muspratt, V., "Contribution à l'étude de *Celerio lineata livornica* Esp." [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 117-125, 180-190, 194-202. "May-June" [7 Dec.] 1949; "Nov.-Dec. 1949" [26 Apr. 1950]; "Jan.-Feb." [12 July] 1950. Migration in Europe. [P.B.]

Tanner, Vasco M., "White-lined Sphinx Moth abundant in central Utah spring 1949." *Great Basin Nat.,* vol. 9: p. 76. 30 Dec. 1949. *Celerio lineata;* larvae feeding on *Norta* and *Polygonum.* [P.B.]

Tillman, Ernst, "Über die Einwanderung von *Celerio lineata livornica* Esp. in Mitteleuropa in Jahre 1946 (Lep. Sphingidae)" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 23-29. 1 May 1950. Discusses a massive invasion of this sp., with a few notes on other immigrants. [P.B]

Warnecke, Georg, "Wanderfalter" [in German]. *Kosmos,* vol. 46: pp. 163-168, 1 pl., 4 figs. 24 Apr. 1950. General account of migration in Lepidoptera; 9 migratory spp. are illustrated in color. [P.B.]

Warnecke, Georg, "Wanderfalter 1946 und 1947 in Deutschland" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 7-10. 1 May 1950. Report on progress in recording migrants in Europe; lists migrating spp., and information needed about them. [P.B.]

Williams, C. B., "The migration of butterflies in North America." *Lep. News,* vol. 3: pp. 17-18. "Feb." [Apr.] 1949.

Williams, C. B., "Migrant butterflies outside North America." *Lep. News,* vol. 3: pp. 39-40. "Apr.-May" [July] 1949.

I. TECHNIQUE

Maessen, Th., "How I kept my butterfly collection in tropical West-Africa". *Ent. Berichten,* vol. 13: pp. 379-380. 1 Dec. 1951.

Nabokov, Vladimir, "Remarks on F. Martin Brown's 'Measurements and Lepidoptera'." *Lep. News,* vol. 4: pp. 75-76. "1950" [Mar. 1951].

J. MISCELLANY

Gozmány, L. A., & G. Lengyel, "Hungarian Lepidopterology - I. A short history." *Lep. News,* vol. 3: p. 43. "Apr.-May" [July] 1949.

Heikertinger, Franz, "Sind die Schmetterlingsbilder in naturkundlichen Werken richtig? Ein Wort über fehlerhafte Tierbilder und iihre Ausmerzung durch die Naturphotographie" [in German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 3-32, 8 pls., 23 figs. 30 June 1947. Calls attention to inaccuracies in many figures of Lepidoptera in 'natural' attitudes; discusses and classifies the normal attitudes of butterflies and sphingids in flight and at rest, illustrating these with excellent figures. [P.B.]

Porter, John E., & John H. Hughes, "Insect eggs transported on the outer surface of airplanes." *Journ. Econ. Ent.,* vol. 43: pp. 555-557. Aug. 1950. Numerous records, all Phalaenidae; *Laphygma frugiperda* and *Prodenia* spp. were identified. [P.B.]

NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Unless withdrawn sooner by the member, each notice will appear in three numbers. We can not guarantee any notices but expect all to be *bona fide.* Please notify us of any abuse of this service.

Wish to exchange with collectors in all parts of the world, the following Lepidoptera: Phalaenidae, Arctiidae, Geometridae, Notodontidae, Sphingidae, Lasiocampidae, Rhopalocera, esp. Hesperiidae. Masami Ogata, Ogata Hospital, No. 18, 3chome, Imabashi, Higashi-Ku, Osaka, JAPAN.

Entire collections of Lepidoptera or season's catch purchased, as well as North American Noctuidae not in my collection. Charles Hill, 1350 San Luis Rey Drive, Glendale 8, Calif., U. S. A.

MORPHO FOR EXCHANGE; Several *M. cisseis* (rare); *M. hecuba, M. rhetenor, M. sulkowskii;* also *Chrysiridia madagascariensis* (= *Urania ripheus*), *Attacus gorgioni* in pairs. Will exchange for what have you. Also Seitz' *Macrolepidoptera,* vols. 1, 2, 3, 4 (German edition). A. Jelinek, 3900 Diversey Blvd., Chicago, 47, Ill., U. S. A.

Anticorrosive steel insect pins in all standard sizes and lengths: black $1.20/1,000; white $1.75/1,000. *Minuten nadeln*: black $0.60/1,000; white $0.95/1,000. Price list available on request. Dr. H. Wilcke, Kössen/Tyrol, AUSTRIA.

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Set of Seitz' Vol. 11 (INDO-AUSTRALIAN NOCTUIDAE), English language edition, all published parts, for sale for $20., about ⅔ the recent purchase price. J. G. Franclemont, Comstock Hall, Cornell University, Ithaca, N. Y., U. S. A.

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For workers with special interest in the American fauna, a very large collection of Brazilian and Bolivian Lepidoptera, 30,000 specimens (⅔moths), all spread and labeled, is offered for sale. These are mostly from the Seitz-Marten Expedition. Specialties are the Hesperiidae (4,000 of more than 750 species) including the Fassl material on which the section in Seitz' work was based; Riodinidae (3,000); Aegeriidae with 8 types; very many Arctiidae. The collection, in three large cabinets of glass-topped cases 40 x 50 cm., is at Frankfurt am Main, Germany. Accessible for inspection. For further information, write Dr. WERNER MARTEN, Guillermo Tell, 44, Barcelona, SPAIN.

NOMINATIONS FOR 1953 OFFICERS

Nominations for offices to be filled at the end of 1952, but not announced in the last issue of *The Lepidopterists' News,* are as follows:

Secretary—FREDERICK H. RINDGE
Treasurer—SIDNEY A. HESSEL.

SEASON SUMMARY FOR 1952

The summary of field conditions for Lepidoptera during the 1952 season (in North America) will be published during the spring of 1953, instead of being the concluding issue of the current volume of *The Lepidopterists' News.* The deadline for submission of individual reports to Area summarizers will be shortly after New Years, but it is urged that these reports be sent to the Area summarizers as soon after the end of the local collecting season as possible. Detailed instructions for the 1952 Summary will appear in the next issue of the *News.* The Area summarizers will probably be the same as for the 1951 Summary.

PROPOSALS CONCERNING CODE OF ZOOLOGICAL NOMENCLATURE

Notice has been received from Capt. FRANCIS HEMMING, Secretary to the International Commission on Zoological Nomenclature, that a number of problems of great importance to zoological taxonomists involving the text of the International Code of Zoological Nomenclature will be brought forward for decision at the approaching International Congress of Zoology to be held in Copenhagen, Denmark, in 1953. These are the following:

1. Emendation of zoological names.
2. Names of families and lower suprageneric categories.
3. Regulating names of orders and higher categories.
4. Type species of genera published in synonymy.
5. Trivial names first published as substitutes for previous names.
6. Neotypes: whether to be officially recognized and how regulated.
7. Means for securing stability in nomenclature.

Volume 7 of the *Bulletin of Zoological Nomenclature* is being devoted to these matters. Systematists especially interested in any of these questions should send their views immediately to the Secretary (28 Park Village East, Regent's Park, London, N. W. 1, England).

The usual list of ADDITIONS TO THE LIST OF MEMBERS will be omitted from this issue because the 1952 List will be published soon.

THE LEPIDOPTERISTS' SOCIETY

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The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. **All other correspondence concerning membership and general Society business should be addressed to the Secretary.** Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

Active Members - annual dues $3.00 (U. S. A.)
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Each year a list of all members of the Society is published, with addresses and special interests. The list is sent to all members.

All members are expected to vote for officers when mail ballots are distributed by the Secretary each year.

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In This Issue

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COLLECTING ALONG THE ALASKA HIGHWAY
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19 February 1953

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.,* mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.,* personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; latin names of genera and species will be italicized, and authors of such latin names will not appear in the title of any paper. The style should conform to that used in recent issues of the *News.* Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

At least 25 gratis reprints will be provided to authors if requested at the time galley proof is received for correction. Additional reprints and covers may be ordered at cost, at the same time.

Address editorial correspondence to: Dr. C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U. S. A.

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Address remittances to: Mr. S. A. HESSEL, Nettleton Hollow, Washington, Conn., U. S. A.

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THE LEPIDOPTERISTS' NEWS

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INSTRUCTIONS FOR THE FIELD SEASON SUMMARY FOR 1952

Once again the time has come for the preparation of the Society's annual Field Season Summary of North American Lepidoptera. The objects of this are to keep members in touch with the season's collecting activities and to provide a permanent record of local and general changes and fluctuations in the abundance and distribution of Lepidoptera in general and of particular species.

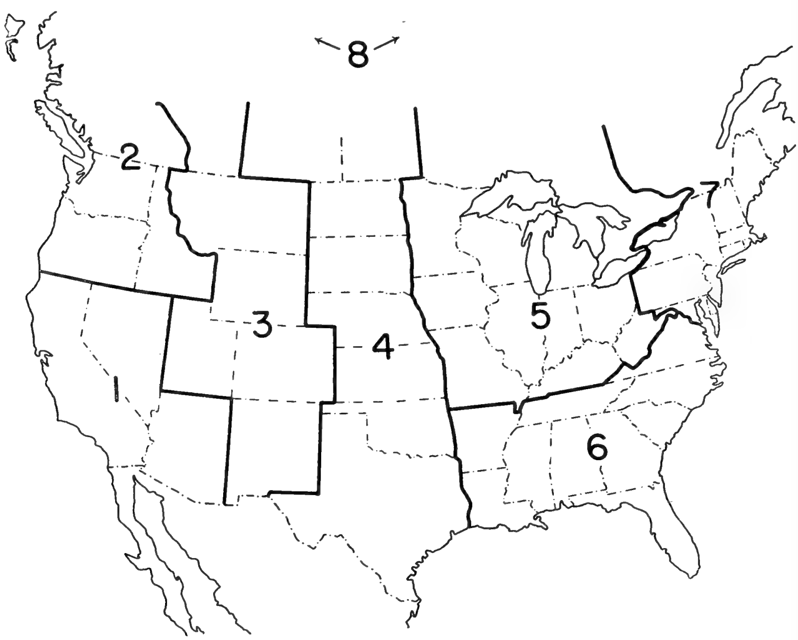
The Season Summary can be made a success only by the willing participation of as high a proportion of North American members as possible. In past years fewer members than we could wish have sent in reports on their own collecting experiences. The more reports sent in, the more representative will be the whole Summary, both on a regional and on a taxonomic basis. Do not let the feeling, that your own results are incomplete or not as good this year as you could have wished, prevent you from sending them in. Although last year's participation showed a very satisfactory increase in coverage, we hope for still better results this time. However big or small your field program may have been, please send us an account of it.

The following kinds of information are especially wanted: (1) Were Lepidoptera in general or certain groups more or less abundant than usual, and especially than last year (the most reliable standard of comparison)? (2) Was the season as a whole, or were parts of it, later or earlier than usual, or about normal? (3) Can changes of abundance or time of occurrence be explained by natural or artificial changes in the environment? (4) Were there changes in the abundance or time of occurrence of particular species, and were the causes of these evident? (5) Were migrations of particular species seen, and if so when and how large and in what direction? (6) Were any species collected for the first time in the region? What species of rare occurrence were taken? Have any species become established in the region by immigration from adjacent regions or by introduction from abroad?

These questions are arranged in approximate order of importance. Observations relating to the whole fauna are of the greatest importance, those relating to fluctuations of occurrence of common species are of next importance, those relating to rare or accidental occurrences are of "news" interest but are unlikely to have great scientific importance.

It will be helpful to Area Co-ordinators if data can be presented in an organized form. The following standardized arrangement is suggested, though some categories will of course be inapplicable in certain individual reports: (1) area dealt with in the report, and the amount and geographical extent of the collecting that was done; (2) weather during the preceding winter and during the collecting season itself; (3) comparison of collecting conditions as a whole with those in past seasons (whether all or some groups were more or less numerous, whether emergences were earlier or later in various parts

of the season) and correlation with weather information; (4) were there adverse factors, such as cloudy or rainy weather, that would be likely to affect the success of collecting, as opposed to the actual abundance of Lepidoptera? (5) observations on the abundance, activity, and importance of natural enemies of Lepidoptera; (6) artificial changes in the environment (clearing, burning, drainage, cultivation, insect control measures, and the like) which affected the Lepidoptera; (7) dates of occurrence and relative abundance of particular species (orderly arrangement, preferably by date of occurrence, is desirable in this section, and PARTICULAR ATTENTION SHOULD BE GIVEN TO COMMON SPECIES, as these are the most likely to yield data that will be reliable and that can be compared with those obtained in other years; in giving dates of occurrence the date of maximum abundance of each generation is more important than the date of appearance of the first individual); (8) note any migrant activity, with full particulars; especially note all possible observations on the Monarch Butterfly; (9) note unusual occurrences, new state, province, or area records; (10) note progress of introduced species; (11) note outbreaks of pest species.



As in the past, the continent is divided for purposes of the Summary into eight areas, shown on the map. For each area a separate summary will be prepared by the Area Co-ordinator, to whom all individual reports for the area should be sent. **Reports should be sent to the appropriate area co-ordinators early enough to reach them by March 10 1953.** After publication of the Summary, the individual reports will be placed in a permanent file in the Society library, for future reference. Please place correspondence with Co-ordinators on a separate sheet.

Promptness is important, as the Co-ordinators have their own deadline to meet. Names and addresses of Co-ordinators are as follows:

AREA 1. (Southwest) — LLOYD M. MARTIN, Los Angeles County Museum, Exposition Park, Los Angeles 7, California.

AREA 2. (Northwest) — J. C. HOPFINGER, Brewster, Washington.

AREA 3. (Rocky Mountains) — J. DONALD EFF, 820 Grant St., Boulder, Colorado.

AREA 4. (Great Plains) — H. A. FREEMAN, 1335 Overhill Drive, Garland, Texas.

AREA 5. (Central) — P. S. REMINGTON, 5570 Etzel Ave., St. Louis 12, Missouri.

AREA 6. (Southeast) — RALPH L. CHERMOCK, Dept. of Biology, University of Alabama, University, Alabama.

AREA 7. (Northeast) — S. A. HESSEL, Nettleton Hollow, Washington, Connecticut.

AREA 8. (Far North) — T. N. FREEMAN, Division of Entomology, Science Service Building, Central Experimental Farm, Ottawa, Ont., CANADA.

SPECIAL REQUEST

As a reorganization of the Survey on the basis of experience gained in its initial years is being actively planned, members are invited to send in, at the same time as their seasonal reports, suggestions as to how the content, preparation, or presentation of the annual summaries might be improved. In particular, consideration of the following questions is desired: Would it be feasible to set up for each Area a list of characteristic or interesting species, the occurrence of which would be given particular attention by Society members each year, so that a continuous record of their abundance and distribution could be secured? Would it be practical to establish certain dates for a continent-wide survey of butterflies, as many collectors as possible going into the field on these days, and recording all species seen or taken, with notes on abundance, condition, etc.? What would be suitable dates from your standpoint, with regard to convenience and coverage of the fauna? Should nocturnal Lepidoptera be included, and if so how? The Christmas census of birds has been carried out with great success for many years, and a similar operation for butterflies at a more suitable time of year might hold promise. Please let us have your opinions on the Summary, as it is designed for your interest and information.

EUGENE G. MUNROE
Associate Editor for the Season Summary

1953 MEETING

The fourth annual meeting of The Lepidopterists' Society will be held in California at the Los Angeles County Museum, on 2-5 July 1953. The Chairman of the Program Committee is FRED T. THORNE, and the Chairman of the Local Arrangements Committee is ROBERT J. FORD.

A EUROPEAN SKIPPER, *ADOPAEA LINEOLA,* AT COLUMBUS, OHIO

by EDWARD S. THOMAS

The European skipper, *Adopaea lineola* Ochsenheimer, according to KLOTS: *A Field Guide to the Butterflies,* has been reported from London, Ontario, southern Michigan, and northern Ohio. The Ohio State Museum has specimens representative of the last two areas, collected and presented by Dr. GEORGE W. RAWSON. The localities are: Findlay, Ohio; Detroit, Michigan (Mack Avenue); and Wayne County, Michigan (see Rawson, G. W., *Journ. N. Y. Ent. Soc.,* vol. 39: pp. 503-506; 1931).

To the stations listed by KLOTS may now be added Columbus, Ohio. On June 13, 1952, Mr. JOSEPH W. ENKE, Battelle Institute, Columbus, brought me a specimen of *A. lineola* which he captured along the Chesapeake and Ohio Railroad tracks, just north of King Avenue in Columbus. On June 19, Mr. ENKE guided me to the place, where we found the butterflies plentiful. My student helper, Mr. BRICE METZGER and I were able to collect 19 specimens, 12 ♂♂ and 7 ♀♀, in an hour's time. All were in fresh condition.

The embankment along the railroad right of way was covered with a dense stand of weeds, through which a number of the specimens were cruising. Their flight was slower and more sluggish than that of most American skippers. Occasionally, however, a cruising male would encounter another perched on the vegetation, when a spirited combat would ensue, with the participants swirling upward for a number of feet in the air before separating.

Individuals were observed feeding upon the flowers of alfalfa (*Medicago sativa**), yellow sweet-clover (*Melilotus officinalis*), and yarrow (*Achillea millefolium*). There were two or three colonies of Indian hemp (*Apocynum cannabinum)* in flower. Although the flowers of this plant are favorites with many kinds of butterflies, no *Adopaea* were observed on them.

The butterflies were found over a stretch of at least a quarter of a mile along the tracks, though the great majority of them were concentrated in the area close to King Avenue where the vegetation was much more lush. They seemed to be plentiful in the vicinity of some patches of quack-grass (*Agropyron repens*). FROHAWK in *The Complete Book of British Butterflies* gives *Agropyron,* along with timothy (*Phleum pratense*) and heath false brome grass (*Brachypodium pinnatum*) as preferred foodplants in Great Britain. Timothy was also plentiful in this site.

In addition to the plants already mentioned, the following were common to abundant: downy brome grass (*Bromus tectorum*); yellow goatsbeard (*Tragopogon pratensis*); rib-grass plantain (*Plantago lanceolata*); Canada goldenrod (*Solidago canadensis*); wild parsnip (*Pastinaca sativa*); white sweet clover (*Melilotus alba*); tall fescue-grass (*Festuca elatior*); and wild grape (*Vitis* prob. *riparia*). Less common plants in the area where the butterflies were most prevalent were: common milkweed (*Asclepias syriaca*); wild carrot (*Daucus carota*); dandelion (*Taraxacum officinale*); spear thistle (*Cirsium vulgare*); Virginia creeper (*Parthenocissus quinquefolia*); field bind-

*Latin names of plants are those of *Gray's Manual of Botany,* eighth edition.

weed (*Convolvulus arvensis*); Jerusalem artichoke (*Helianthus tuberosus*); pricky lettuce (*Lactuca scariola*); black bindweed (*Polygonum convolvulus*); yellow rocket (*Barbarea vulgaris*); red-top (*Agrostis alba*); common mullein (*Verbascum thapsus*); black mustard (*Brassica nigra*); and burdock (*Arctium minus*). It will be noted that the great majority of these plants are common weeds of European origin.

The Columbus branch of the C. & O. Railroad connects directly with Detroit. Whether this fact is of significance as regards any relationship between the Detroit colony of *A. lineola* and the one at Columbus is, of course, not known.

Ohio State Museum, Columbus, Ohio, U. S. A.

THE APPARENT INFLUENCE OF ISOLATION IN SOME SPECIES OF GEOMETRIDAE

by George F. Pronin

Much has been written in Europe about melanism in Lepidoptera, sometimes said to be caused by industrial gases. An explanation made was that fumes arising from industries had contaminated the air.

I have observed the dark forms of *Boarmia crepuscularia* Schiff. in two different places: Lutsk, Wolhynia, Poland, and Marienbad, Czechoslovakia. I am satisfied that in both cases the melanistic population resulted from the isolation in which the broods lived.

At Lutsk the broad-leaf host trees of *B. crepuscularia* were surrounded by large fields, and the moths had to mate with their nearest relatives; the introduction of new blood was not readily possible. The situation at Marienbad was similar, only in that case the isolation was caused by a large area of a pure stand of spruce (*Picea* sp.) which extended for many kilometers; the host trees were not numerous on the mountainside near the town, and the beautiful dark *B. crepuscularia* "form nigra" existed only because of the isolation.

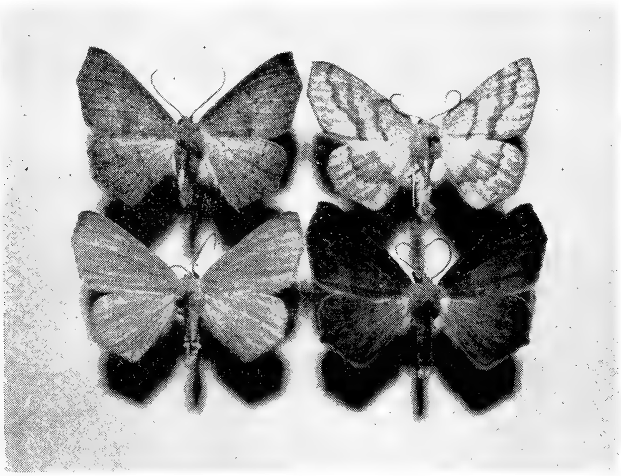
Interesting observations were made of *Amphidasis betularia* "form doubledayaria" dark form (= carbonaria), which I caught in 1943 in the town garden ("Volkspark") of Lodz, Poland, using a caged female of this species.

8 June: a ♂ of *Amphidasis* was attracted and caught; 12, 16, 22 June: each a ♂ of *A. betularia* "f. doubledayaria"; 8 July: I found a pair of this dark form *in copula*, indicating that the population was numerous.

I reared the progeny from the above mating and obtained 14 pupae. The last caterpillar pupated on 31 August 1943. Next year (1944) the moths emerged, all of *A. betularia* f. doubledayaria: 27 May, 2 ♀♀; 29 May, 2 ♀♀; 30 May, 1 ♂; 31 May, 2 ♂♂ and 2 ♀♀; 1 June, 2 ♂♂ and 2 ♀♀. One pupa died, but upon dissection proved to be of the same dark form.

This experiment offered convincing proof that the dark form doubledayaria could not be a result of industrial influence (the mills were not in operation at that time anyhow), but was of genetic origin. The "Volkspark" is isolated by 25 kilometers from the nearest forest.

In California an example of isolation is well shown by *Sabulodes caberata* "form cottlei" in San Francisco. The species is a feeble flier; the San Francisco population, virtually restricted by geography and suburban expansion to Golden Gate and other city parks, is not in contact with the typical form. As a result of such separation there has arisen a dark form which was described as "f. cottlei" by Barnes and Benjamin.



Above: *Sabulodes caberata* Gn. (left) and *S. caberata* "f. arsesaria".
Below: *S. caberata* "f. aegrotata" (left) and *S. caberata* "f. cottlei".

Dr. EDWARD S. ROSS and Mr. HUGH B. LEECH, of the California Academy of Sciences, kindly aided in the preparation of the manuscript and Dr. ROSS took the photograph. I thank them most sincerely.

Literature

Barnes, William, & F. H. Benjamin. 1926. "A new form of *Sabulodes caberata* Gn. (Lep. Geom.)." *Pan-Pacific Ent.*, vol. 3: p. 41.

Packard, A. S., Jr. 1876. *A monograph of the geometrid moths or Phalaenidae of the United States.* 607 pp., 13 pls. Washington.

California Academy of Sciences, San Francisco 18, Calif., U.S.A.

CONCERNING THE IDENTITY OF *MITOURA NELSONI MUIRI*

by J. W. TILDEN

The type locality of *Thecla muiri* as given by HENRY EDWARDS (*Papilio,* vol. 1: p. 53; 1881) in his original description of this species (as he regarded it) is Mendocino County, California. The author has made several attempts to locate colonies of *Mitoura nelsoni* subspecies in Mendocino County, so far without success. However, material from the Mt. St. Helena district of Lake and Napa Counties fits EDWARDS' description and is referable to *muiri.* This district is about forty miles airline distance from apparently suitable territory in Mendocino County, and lies inland (east) from it. The habitats and faunae are quite similar.

Upper figures *Mitoura nelsoni nelsoni;* lower figures *M. nelsoni muiri;* ♂ ♂ on left, ♀ ♀ on right.

M. n. nelsoni; ♂: Scott River, Siskiyou Co., Calif., 21 June 1946; ♀: Greenhorn Mts., Calif., 25 June 1950. *M. n. muiri* ♂ and ♀: St. Helena Creek, Lake Co., Calif., 9 May 1952. All collected by J. W. TILDEN.

An examination of specimens placed as *muiri* in collections would seem to indicate that this race or subspecies has been misidentified on some occasions. It seems clear that EDWARDS had before him material from the coastal area of California when he wrote his description of *muiri.* The light material from inland localities cannot fit his description sufficiently to be referred to *muiri.* The accompanying figures show well the differences stressed by EDWARDS: the darker coloration of the inferior surfaces and the more irregular course of the macular band, as well as the smaller size.

Mitoura nelsoni is quite widely distributed in certain of the mountainous regions of western United States. As far as I can find, the early stages have never been described. However, I have found one common denominator in all localities of occurrence: *nelsoni* is always found in association with the Incense Cedar (*Libocedrus decurrens* Torr.). Since other members of the genus *Mitoura* are known to feed in the larval state on the foliage of trees of the family Cupressaceae, it is a reasonable assumption (by no means proven) that Incense Cedar is the food plant. Discussion with certain other collectors has shown that they have made a similar observation.

Incense Cedar grows at moderate elevations in the Sierra Nevada, but its range is extended to higher elevations in the mountains of southern California. Coastwise and northerly, the elevation at which this tree occurs is forced down by the cooler climate and the occurrence of summer fogs. In each case, the occurrence of *Mitoura nelsoni* is altered to coincide with that of the Incense Cedar. This tree is found in mixed coniferous forest, often as a "borderline" tree, growing on ecological interfaces where pine forest grades into chaparral, or on poor rocky ground in pine forests, or on steep rocky slopes of poor water content, and its distribution is therefore spotty or discontinuous. It seldom forms very large pure stands, although it is a common tree. The colonial or discontinuous distribution of *Mitoura nelsoni* may be due, at least in part, to this discontinuous distribution of the tree with which it is associated.

The area in the Mt. St. Helena district where the specimens of *muiri* were taken is formed of dark volcanic rock, and the flora consists of Ponderosa Pine, two species of cypress, Knobcone Pine and Douglas Fir, in addition to Incense Cedar, and with Live Oaks, Tan Oaks and Black Oaks, in addition to many species of bushes. The butterflies were found feeding on the blossoms of various species of *Ceanothus,* of which there are several in the area.

I wish to thank Mr. LLOYD M. MARTIN of the Los Angeles County Museum for checking specimens and the photographs with his material, and Mr. LESTER BRUBAKER of San Jose State College for his excellent photography.

San Jose State College, San Jose, Calif., U. S. A.

A DRAFT KEY TO *TAYGETIS* (SATYRINAE)

by WILLIAM T. M. FORBES

The genus *Taygetis* is wholly tropical American, and is one of the most striking of the family. While the species are not many, some of them are variable, and easy to confuse. The following key is not critical but is believed to be fairly correct. It is based mainly on the material in the Cornell University collection, supplemented by the literature, which happens to be rather less ambiguous than usual in the butterflies.

The genus *Taygetis* is used here in about the sense original with HÜBNER and corresponding to that of later authors, including WEYMER in SEITZ'S *Macrolepidoptera of the World* and GAEDE in Fascicle 46 of the *Lepidopterorum Catalogus.* It is not definable on present knowledge, like many current Satyrid genera, but roughly represents large neotropical Satyrs with typical venation, appearance, and pattern, and most often hairy eyes. I have not indicated transferred generic position by parentheses about the author's name, for I consider that generic references in the Lepidoptera are up to now plastic and of no great significance. In this genus sexes are similar, and there is no need for special provisions for the females. Only two species show noticeable sex-scaling, which is on the disc of the hind wing, and only in *T. zippora* is it at all striking. Characters, where not otherwise indicated, are on the under side of the hind wing.

1. Hind wing with a tail at the end of M_3, twice as long as wide; under side of fore wing violet-blue subterminally .... ***yphthima*** Hübner
   Hind wing waved or scalloped, but without a definite tail; fore wing not blue subterminally 2
2. Postmedial line of hind wing below sharply cusped at M_3, and shaded beyond with reddish; vein M_3 lined with black to margin .... ***angulosa*** Weymer
   Postmedial line nearly straight, excurved or waved, not cusped 3
3. A pale yellow longitudinal stripe from base of hind wing to beyond middle .... ***penelea*** Cramer
   No yellow longitudinal stripe 4
4. Postmedial line straight or slightly excurved, passing close beyond end of cell .. 5
   Postmedial line strongly excurved, more or less parallel to outer margin 20
5. Eyes naked; a large species (90 mm.) with falcate apex and sinuous outer margin .... ***mermeria*** Cramer
   Eyes hairy, though sometimes minutely; species with acute apex never so large .. 6
6. Hind wing below with broad converging white ante- and postmedial bands .... ***albinotata*** Butler
   Antemedial band not broad and white 7
7. Postmedial line above rather conspicuous and shaded beyond with whitish .... ***tripunctata*** Weymer
   Postmedial line sometimes visible above, but if so not followed by a pale shade .. 8
8. Male with black sex-scaling on hind wing; fore wing above with a conspicuous but vague pale subapical area; pm. line below reaching costa at barely 3/5 length of wing 9
   Male rarely with pale apical shade, and if so pm. line much further out on under side 10
9. Sex-scaling of male inconspicuous, diffuse and covering much of surface of hind wing; under side wholly nearly black, without contrasts ...... ***echo*** Cramer
   Sex-scaling on hind wing a rounded central patch; under side with prominent markings of normal type .... ***zippora*** Butler
10. Both wings below with basal two thirds nearly black, obliterating the am. line and contrasting with the brown outer third .... ***xenana*** Butler
   Basal two thirds not black, the am. line easily visible 11

11. Apex of fore wing acute, the outer margin sinuate and concave at R_5; am. line extremely irregular, not contrasting 12
Apex of fore wing rounded over or obliquely truncate and bent or angled at R_5, the margin at R_5 never concave 13
12. Whitish shading beyond pm. line irregular and spotty, missing over cell M_3 .... ***fulginia*** d'Almeida
Whitish shading beyond pm. line even, usually becoming somewhat narrower toward inner margin .... ***rectifascia*** Weymer
13. Border of hind wing above yellow and contrasting; a very large species (90 mm.) .... ***chrysogone*** Doubleday & Hewitson
Border of hind wing not light and strongly contrasting 14
14. Ocelli of hind wing below inconspicuous and nearly reduced to white dots .. 15
Ocelli conspicuous, at least with well developed brown surrounding rings 16
15. Hind wing with an acute angle at M_3, and deeply and evenly concave below it .... ***acuta*** Weymer
Hind wing with the angle at M_3 less marked, the margin below it slightly concave and waved .... ***virgilia*** Cramer
16. Am. line of fore wing stopping at lower edge of cell* 17
Am. line clearly continued well below cell 19
17. Am. and pm. lines of hind wing fine and clear on an even brown ground .... ***nympha*** Butler
Lines shaded with brown on side toward median area; ground often shaded or somewhat mottled 18
18. Smaller, blacker, outer ring of ocelli very fine, well out and yellowish .... ***inconspicua*** Draudt
Larger, paler, the anal ocellus and pm. line usually showing through; yellowish ring of ocelli broader and diffuse .... ***andromeda*** Cramer
19. Smaller; ocelli ringed with black .... ***salvini*** Staudinger
Larger, ocelli diffusely ringed with brown .... ***puritana*** Weeks
20. Hind wing with am., pm., st., and adt. dark lines on an even brown ground, the ocelli represented at most by minute white points ...... ***inornata*** Felder
Ocelli more conspicuous, if reduced to white dots ground mottled or shaded .. 21
21. Fore wing subfalcate, concave over end of R_5; pm. line of fore wing waved .. 22
Fore wing rounded over or truncate, the margin convex opposite R_5 24
22. Hind wing below with a large proportion of coal black, the cell iridescent peacock blue .... ***larua*** Felder
Hind wing otherwise; without any iridescent scaling 23
23. Hind wing deeply scalloped; ground dark umber .... ***armillata*** Butler
Hind wing moderately scalloped; under side mottled gray, including outer half of cell .... ***jimna*** Butler
24. Postmedial line of fore wing regularly scalloped; two of the ocelli with large black rings .... ***valentina*** Cramer
Postmedial line of fore wing not scalloped; only the lower ocellus (in cell Cu_1), if either with large black ring 25
25. Postmedial line of fore wing concave, its upper and lower ends extending outside line of white dots representing ocelli .... ***banghaasi*** Weymer
Postmedial line of fore wing more or less excurved; its ends not approaching subterminal area 26
26. Larger species; pm. line of fore wing heavily shaded with brown and angled opposite cell 27
Smaller species; pm. line more sharply defined and not angled opposite cell .. 28
27. Angle of pm. line lengthened into a triangular point opposite lower angle of cell, almost interrupting the pale st. area; and concave below .. ***uncinata*** Weymer
Pm. line merely bluntly angled, nearly straight above and below .. ***celia*** Cramer
28. Pm. line moderately excurved on both wings; ground deep brown .. ***kerea*** Butler
Pm. strongly excurved on fore wing and sharply bent on hind wing;, ground normally mottled light gray .... ***weymeri*** Draudt.

Department of Entomology, Cornell University, Ithaca, N. Y., U.S.A.

*Not stated in description of *inconspicua,* which is compared with *andromeda.*

NOTES ON COLLECTING *ANTHOCARIS MIDEA* AND *EUCHLOE OLYMPIA*

by F. R. ARNHOLD

After reading Dr. RAWSON'S item "Hilltops and *Anthocaris*" (*Lep. News* vol. 5: p. 70), I feel that I should relate my experience with *A. midea* and especially *Euchloe olympia*. I have taken *E. olympia* in Missouri, Minnesota, and Wisconsin. Unfortunately I am unable to give their complete life history, altho I have tried to study their habits fairly closely.

E. olympia is found in local and favored spots, on hillsides and the crests of steep and narrow ridges. In Missouri I find that their time of flight overlaps with *A. midea,* and both may be taken in the same location at the same time; however *E. olympia* shows up a few days to a week before *A. midea.* Their time of flight is when the wild plums are in bloom. Both are Cruciferae feeders, feeding on *Arabis* (rock cress).

In Missouri, where the St. Louis collectors consider *E. olympia* a choice species of Lepidoptera, I have taken them at Meremec Highlands and at Rankin. There I found *E. olympia* on the crests of the narrow rocky ridges. On top of these ridges there is a good view of the steep hillsides. From this vantage point the males were observed flying up the side of the ridges within a foot or two of the ground, evidently in search of females. Upon reaching the crest they would fly parallel with the crest rather than down the other side. Upon seeing another of its kind not too far from its line of flight, it would go over to investigate. If it was another male there would be a minor dispute and then each went on its way again. The female would fly in a similar manner, somewhat slower, searching for the food plant.

The females were observed to deposit only one egg at a time on the tender leaves of the flower stem of rock cress, which grows on these narrow rocky ridges. One female was observed depositing an egg and then, after hunting around for approximately 30 seconds, came back and deposited another egg on the same plant before leaving for another place. I lifted a number of plants of rock cress that had similar eggs on them and tranplanted them in St. Louis. I placed a large screen cage over the whole patch. Unfortunately I had to farm these out, and not being around to look after them, I missed out on being able to give an account of the larva. When the adults emerged the following spring there was one *A. midea* with them. We can therefore assume that both species are single brooded in that area.

In Minnesota, I took *E. olympia* in larger numbers than in Missouri. The location was a non-glaciated area at Dresbach, Minn., approximately 8 miles north of La Crosse, Wisconsin, on highway #61. Here there are rocky ridges that run back from the bluffs facing the Mississippi River. These ridges rise to about 500 feet above the river valley, and in many cases are very thinly wooded or entirely bare of trees. On top of these ridges *E. olympia* acted like they did in Missouri, and I also noticed that they preferred the leeward side of the ridges. The wind blows quite strongly on top of these in spring. Some, on approaching the crest of the ridge, would be picked up by a strong gust of wind and blown as much as a hundred feet out over the valley, where they were noticed to return to the slope and start up again. However I

never came across a single specimen in the valley, while they were plentiful on top of these ridges.

The location in Wisconsin happens to be the writer's back yard at his residence on Lake Wissota. It is a prairie-like area north of Chippewa Falls, Wis., and was heavily glaciated. It was at some time in the prehistoric past a lake formed by the receding glaciers. In more recent times it was covered with a pine forest, and at present no trees are left except a few on waste land and along the streams. It is all sand and gravel with a thin layer of topsoil. The elevation is 960 feet above sea level. *E. olympia* flies on top and the sides of the bank bordering the lake. The banks of the lake are rather steep and about 65 feet high in most places. The winds are rather brisk in spring and set up considerable turbulence on top and sides of this bank, while there is nearly always a narrow band of calm either on top or on the side of the bank depending on the wind direction. This band of calm seems to be their line of flight, and they travel parallel with the bank. Rock cress can also be found growing on the bank.

So far I have only taken *Anthocaris midea* in Missouri at the following locations: Meremec Highlands, Rankin, Glencoe and Bagnell. Bagnell is near the Lake of the Ozarks. *A. midea* was observed to go farther afield from the ridges and could be taken at lower elevations, and some were even seen flying across the valleys between the ridges. However they were found in greater numbers on the hilltops, males predominating.

Since their food plant prefers to grow on the ridges, I wonder if they do not consider these their private domain, and could it be that the males prefer the hilltops as a sort of lovers' lane?

Route 3, Chippewa Falls, Wisconsin, U. S. A.

LURING *ANTHOCHARIS SARA* INTO THE NET

After missing about one out of every four males of *Anthocharis sara* Bdv. which flew rapidly and erratically through our patio in La Tuna Canyon, I decided the only way to get a good series of these adept net-dodgers was to use a decoy in order to take advantage of their habit of chasing one another. Into the lower side of the thorax of a recently killed male, whose wings were spread out horizontally, I inserted one end of a green-colored pipe-cleaner which I had wrapped around the winged nut that fastens my net hoop to the handle, and had bent so that the specimen rested in the center of the net opening.

As soon as the next male *sara* came within several feet of the net, he dived toward the decoy specimen, and was easily captured by a gentle flip of the net. Since all the males followed approximately the same route along the terrace, I stood in one spot, or sat in a garden chair, holding the net in their line of flight. Every male that came within five feet flew down to investigate the dead specimen.

The system worked so well that few specimens escaped, and I netted over sixty males during May 1952. Only fifteen females were seen during this period.

Although I have not tried this system on other species, I imagine it might bring good results with some of them.

WILLIAM H. EVANS, 8711 La Tuna Canyon Road, Sun Valley, Calif., U. S. A.

BUTTERFLIES AND HILLTOPS

by JAMES R. MERRITT

In a recent note by RAWSON (*Lep. News,* vol. 5: p. 70) *Anthocaris midea* Hbn. is reported in New York as frequenting the top of an outcropping of rock some thirty feet higher than the surrounding terrain. A comment by the Editor suggested that the presence of the species might be explained by the presence of its food plant, rock cress. In a subsequent note by MATHER (*Lep. News,* vol. 6: p. 42) *A. midea* is reported as showing no preference for hilltops in Mississippi. To this material I should like to add some observations of my own and pose some quaeres concerning "hilltopping" generally.

Near Louisville, Kentucky, lies a range of low hills called the Knobs which rise rather abruptly to an elevation of 850 feet, which is 400 feet above the surrounding bluegrass plain. In the spring *A. midea* is not uncommon along the **tops** of the ridges. All of the specimens observed on the ridges — say 100 individuals — were males. Lower down on the **sides** of the hills I have taken two females, but I have never seen a male except right on top. Both males and females have been taken on the bluegrass plain but are rare. On the ridges several males will fly in a kind of pattern or route which is roughly circular and sufficiently predictable that it is possible to station one's self with reasonable assurance that an opportunity to capture a specimen will be afforded. These males fly one to four feet above the ground and rarely climb higher unless disturbed. Not all ridges in the Knobs are favored with a flight of *A. midea.* For example, at one point three ridges converge and at the point of confluence there is a small flat. In six visits covering three years, I found *A. midea* on the flat and along the north and west ridges but never on the south ridge.

In these same hills *Papilio marcellus* Cram. (early spring form) shows a similar preference for the tops of the ridges. This species also flies at a rather constant level about three and a half feet above the ground. Of about twenty specimens captured, all were males. Although I have visited these ridges many times during the summer, I have never observed the summer form of *P. marcellus* flying in a similar pattern.

To a more limited extent *Papilio glaucus* L. and *Papilio polyxenes asterius* Cram. also fly in patterns about these same ridges. *P. glaucus* does its flying at a considerably higher level, rarely descending below seven or eight feet. *P. p. asterius* flies only on the more open ridges where the timber has been cleared away.

In Colorado I have observed similar phenomena in the foothills near Boulder. There, however, the species were *Euchloe olympia* Edw. and *Papilio eurymedon* Luc. Again only males were involved.

In New Mexico above the town of Raton some hills rise to an altitude of 7,500 feet. At the very tops of these hills I have found *Papilio polyxenes asterius* (?) demonstrating the same behavior. On one hill I frequently captured *Papilio philenor* L. flying a pattern about the top. In eight years collecting in Raton I never took a *P. philenor* in any spot other than the top of that one hill. One or two individuals, however, could be found there with great dependability.

In California *Papilio zelicaon* Luc. is commonly found on the tops of hills. Frequently I have found a group of several males flitting about a bare outcropping of rock on some elevation.

My observations in Kentucky, Colorado, New Mexico, and California, although limited, seem to warrant several findings of fact: 1. Some butterflies are more numerous on the tops of hills. 2. Groups of individuals appear to fly in roughly defined patterns about hilltops. 3. These butterflies are mostly males. 4. The butterflies are either Papilionidae or Pieridae.

Assuming the validity of my findings, what is the explanation? Various hypotheses suggest themselves readily.

1. They are attracted by the food plant. If the food plant were the attracting agency, females should be found, whereas, my observations have disclosed only males. Furthermore, it is difficult for me to believe that food plants in the area would keep the butterflies on the tops of the ridges. The food plant supposition also fails to explain why the butterflies fly in patterns.

2. They are blown to the ridges by the wind. This might explain how the butterflies got there, but why do they stay there? Besides, I have known the butterflies to hover about hilltops on windless days.

3. They are subject to a tropism. To explain this behavior by a tropism is a teleological explanation and little better than stating that these butterflies fly around hilltops because they fly around hilltops. The "why" inquiry still remains.

4. They represent surplus male population like butterflies congregating about puddles. Why butterflies go to puddles has the simple explanation that they are thirsty, but I know of nothing to be satisfied by climbing to the top of a hill.

5. They just like hilltops. My friends, the biologists, will insist that I repudiate this suggestion as "anthropomorphic" even though it explains my own presence on the hill.

None of these hypotheses seems tenable to me and I should be interested in the true explanation, or in other theories.

School of Law, University of Louisville, Louisville, Ky., U.S.A.

Editor's note: Mr. MERRITT has not mentioned two important reasons, both suggested by Mr. ARNHOLD'S paper, why the butterflies might be on hilltops: first, if the foodplant is found only there (and he gives no information on foodplants), that is where emergence from the pupa occurs and where fresh adults may be most numerous; second, and correlated with the first, if the foodplants are concentrated there (which is true for *Anthocaris* and *Euchloe* in Connecticut and Missouri), and if, as recent observations indicate, females mate almost immediately on emergence, then males successful in finding mates must patrol the hilltops. Females of *Euchloe* and *Anthocaris* begin to fly long after the males, so the lack of females on a hilltop may be solely a result of the date of the collector's visit. The Papilionidae and the Nymphalidae which also abound on high pinnacles seem to me to be there for a very different reason from the Euchloini. What we need most are actual counts of individuals of these various species, counts made on the hilltops, the slope, and the base on a series of dates. Notes of such observations are invited from lepidopterists in any part of the world.

C. L. REMINGTON.

COLLECTING ALONG THE ALASKA HIGHWAY

by P. S. Remington

Ever since one of our married daughters moved with her family to Alaska several years ago, we have toyed with the idea of making the trip along the famous Alaska Highway. Each time an article appeared about the Highway in some periodical it was eagerly read. Of course, not the least attractive part of the idea was the prospect of collecting many of the northern species of Lepidoptera which I had never collected before. Finally in the spring of 1951 it began to seem really possible to make the trip, and definite plans were laid. We bought a Nash car because we liked the built-in bed which can be quickly made and we were not sure what sort of accomodations could be secured on the Highway. Maps and highway information were obtained from the Canadian government and camping and collecting gear were assembled.

On June 28 we left St. Louis heading for Boulder, Colorado, and almost did not get thru Kansas because of the floods. At Boulder we stayed with our good friend Donald Eff and found Dr. Charles Remington and his family, who were returning from a trip to California. Our first camp after leaving Boulder was at Nash Fork Picnic Ground in the Snowy Range of southern Wyoming. The range proved to be well-named, for there were ten-foot snow banks right beside the camping spot, and it was the coldest camp of our entire trip. No butterflies whatever were seen, altho in previous years I had found very good collecting here. It was not until we were on our way down the western slopes of the Snowy Range, in the Medicine Bow National Forest that we saw a few familiar butterflies-*Erebia epipsodea* Butl., *Glaucopsyche lygdamus oro* Scud., and a species of *Erynnis.*

Our next collecting spot was near Moran, Wyoming, in the Teton National Forest, and here we took *Erebia callias* Edw., *Oeneis chryxus* Dbldy. & Hew., *Coenonympha haydenii* Edw., *Anthocharis sara* Bdv., and many *Plebeius saepiolus* Bdv. We also saw several of the gorgeous day-flying saturniid moth, *Pseudohazis,* but failed to net any. I have caught these in quantity several hundred miles to the south at Rabbit Ears Pass in Colorado. No collecting was attempted in Yellowstone Park because of the law prohibiting it. After leaving the Park, I saw a number of *Oeneis chryxus* flying over a rock-slide near Bozeman, Montana, and caught a few.

We crossed the Canadian border at Coutts, Alberta, and drove north to Calgary, then east for a side trip to Banff and Lake Louise. This is a classic collecting spot made famous by Thomas Bean and others who collected Lepidoptera there late in the nineteenth century. However, it rained or threatened to rain the whole time we were there, and I saw no Lepidoptera on the wing. The beauty of Lake Louise well repaid our time and effort and we were much imprerssed with the efficient way the Canadian National Parks are run.

We went back to Calgary and north to Edmonton, which we reached in a blinding rain-storm. Seldom have I seen it rain so hard, and it was an omen of what lay ahead of us before we could reach Mile Zero on the Alaska Highway at Dawson Creek. Leaving Edmonton on July 7 we did a little

collecting at Smith, Alberta, where we saw our first northern *Colias,* a rather large, swift species, possibly *C. gigantea* Stkr., All of the *Colias* taken on the trip are now being studied at the Osborn Zoological Laboratory at Yale University, and definite identification is not yet possible. After a very anxious time plowing thru the muddy roads between Smith and Dawson Creek, we reached the famous "Milepost Zero" in the main street of the latter town, which is the official beginning of the Alaska Highway.

Few people realize that, of the 1527 miles from Dawson Creek, British Columbia, to Fairbanks, Alaska, 1221 miles are in Canada. For the benefit of those who may feel the urge to try this trip, I can say that the Alaska Highway itself is a broad, well-gravelled, marvellously engineered road, passable in all weather. The approaches to it on either end are something else, but if you hit them in dry weather, you will have no trouble. Because the Highway is gravel at present, high speed is not advisable, and the driver should not plan to cover more than 300 to 350 miles per day. Ft. Nelson, a little highway settlement at mile 300, is the last sign of permanent habitation, except for highway lodges, until one gets to Whitehorse, Yukon Territory, at mile 919. You will see no farms, no village, and you will obtain no fresh fruit, fresh vegetables, milk, or meat. The road passes thru an extremely wild section of the North Canadian Rockies, but it is so laid out that the highest point on it is at only 4250 feet elevation. Yet in Alaska you will pass mountains over 19,000 feet high. It is densely forested thru much of the route, with aspen and evergreens, and there are vistas of surpassing grandeur at every turn. The beauty of most of our camping spots will long remain in our memory and seems to persist after the discomforts of mosquitoes and dust are forgotten, so that in retrospect the trip becomes better and better. The many streams and lakes along the route are teeming with trout and grayling, and game is often seen along the road. A breakdown of your car might be serious were it not for the fact that every passing car stops and offers assistance. The greatest distance between lodges or gas stations is about 50 miles, which compares favorably with roads I have taken in Wyoming. Gasoline was high in price, 60¢ a gallon at Whitehorse, but this is Imperial gallons (five quarts), and it has to be hauled so far that the price does not seem out of line.

T. N. FREEMAN, in his article "Northern Canada and Some Northern Butterflies" (*Lep. News,* vol. 5: pp. 41-42) shows a map on which the Alaska Highway is traced and indicates that until approaching the Alaska border, the arctic tundra zone is not encountered to any great extent. He writes: "The arctic tundra, altho inhospitable at times, supports countless thousands of specimens of a few butterfly species, and at times it is possible to collect over 200 specimens of a single species in a day." I cannot say that I was ever fortunate enough to find such an abundance of butterflies. I tried the muskeg at many points, but found very few butterflies, often none at all. Perhaps I was a little late for their best season. Certainly the tundra seemed very dry, and it was over 90° F. when we crossed into Alaska.

Much of my collecting was done along the Highway at spots which would doubtless be classed as Canadian Life Zone ecologically. *Papilio glaucus canadensis* R. & J. was seen along the roadside frequently until about mile 800, and at intervals in a belt extending from mile 600 to mile 825 a few *Papilio machaon aliaska* Scud. were seen. At Rancheria Hotel, mile 710, I

took several of these along the bank of the lake at a spot where sewage from the hotel was seeping into the lake. We stopped frequently at likely looking spots, and my notes show that at mile 107 (there is a mile post every mile so that one can identify his locality very easily), the northern *Colias* became more plentiful and I took many *Colias palaeno chippewa* Kby. (probably); also *Pieris napi* L., *Euchloe creusa* Dbdly. & Hew. and a form of *Euphydryas anicia* Dbldy. & Hew. At mile 159 I took one *Boloria frigga saga* Staud. and saw several more. *Erebia epipsodea* was found all along the route, gradually evolving until at Burwash Landing in the Yukon Territory, we found a geographical form which may be worthy of a separate name.*

As one goes further north the days in summer become longer. In fact, there is practically no darkness at all in July and early August, and we were told that each year a baseball game is played at Fairbanks at midnight without artificial lighting. It is difficult to get used to this. This explains why I collected butterflies at mile 325 as late as 7:30 in the evening, including *Limenitis arthemis* Dru., *Nymphalis antiopa* L. and *N. milberti* Godt., *Boloria selene* Schiff., *Phyciodes tharos* Dru., *Plebeius saepiolus,* and *Colias palaeno chippewa.* Also seen flying at this time of day was a species of the sphingid moth *Hemaris.* At Rancheria Hotel, mile 710, I hiked around the little lake back of the lodge and found two species of *Boloria, B. selene* and *B. freija* Thun., and saw a *Carterocephalus palaemon* Pall. At mile 791 I took several *Hesperia* and a number of beautiful little Aegeriid moths, not yet identified, feeding on Yarrow flowers.

One of the best collecting spots found was near Burwash Landing, Kluane Lake, Yukon Territory. Here there were some swales very much like those found in Michigan or New England. But even here there was no riot of butterflies. Besides the distinctive form of *Erebia epipsodea* mentioned above, I took one *Oeneis jutta alaskensis* Holl., one *Coenonympha* (possibly *inornata* Edw.), *Phyciodes tharos, Plebeius* (*scudderii* Edw.?), *P. saepiolus, Colias sp.* A little further along I found the *Colias* more common, two species, and a very dark *Pieris napi.*

On July 13 we crossed the Alaska line and left the Highway at Tok Junction where we took the cut-off to the Glenn Highway which goes into Anchorage. Here they were working on the road, and the going was very rough and hazardous: 29 miles in four hours. Forty miles down this road we took what was later to be our commonest butterfly of the trip, *Boloria titania,* near *grandis* B. & McD. On Compositae along the road we took *Plebeius* (*scudderii?*), *Colias* sp., *Phyciodes* sp., and *Lycaena helloides* Bvd. This was muskeg area. These five species constituted just about the roster of collecting around Mendeltna Lodge at mile 153 of the Glenn Highway, where we stayed for two weeks. It rained frequently. I tried collecting near Sheep Mountain on the way to Anchorage, but nothing was flying at what looked like an ideal spot.

On the way home from Alaska we found *Boloria titania grandis* everywhere, especially at mile 340 on August 3, where we caught over 50 in 20 minutes. Curiously enough we saw *Nymphalis antiopa* even as far north as

*Note: Since this was written the *Erebia* has been named *E. epipsodea remingtoni* Ehrlich.

mile 1416, within about 100 miles of Fairbanks. They were always flying high and fast across the road, as if bound for some place. Near Dawson Creek on August 4 we saw our first *Speyeria* in Canada, apparently *S. atlantis lais* Edw. This was the last significant collecting we did on the trip, for our time was running out, and we were due back in St. Louis.

My impressions of the trip, from the standpoint of butterfly collecting, are largely disappointment at the relative scarcity of specimens and also one of wanting to go back and try again. If one could travel along the Alaska Highway as slowly as he pleased, searching thoroly, and take a whole summer to do it, he might turn up important things. Surely the weather could not be so bad again! At one place we stopped, at Lesser Slave Lake, a man told us they had not had so much rain in 16 years. At any rate, it was a marvellous trip, and one to add to our store of pleasant memories.

5570 Etzel Ave., St. Louis 12, Missouri, U. S. A.

NOTES ON *ANTHOCHARIS SARA* AND *REAKIRTII*

by WILLIAM H. EVANS

When a series of *Anthocharis reakirtii* Edw., which were the offspring of a female *A. reakirtii,* emerged in February and March, 1942, I was puzzled about the relation of this form to *A. sara* Bdv. Within the next eight years I reared several more broods of *A. reakirtii* obtaining the same results as with the first lot. Most of them emerged after ten or eleven months in the pupal stage; a few remained in this stage twenty-two months, and two as long as thirty-four months.

In May, 1950, two confined *A. sara* oviposited. One of these was collected in La Tuna Canyon, Verdugo Mountains; the other, in the Santa Monica Mountains: both localities in Los Angeles County, California. These ova hatched in four or five days, and the larvae pupated in late June. From these chrysalids, seven male and nine female *A. reakirtii* emerged in February, March, and April, 1952. The majority are slightly larger and have more yellow on the under side between the orange patch and the apex of the primary than any of the offspring of *A. reakirtii.*

The results of these rearings seem to indicate that there are two types of *A. reakirtii:* one, the offspring of *A. reakirtii;* the other, the offspring of *A. sara.* I presume that a mating of a pair of the *A. reakirtii* which were offspring of *A. sara* would have produced a brood of *A. sara* that might have emerged this May when *A. sara* was unusually abundant in this canyon. The only *A. sara* I have reared emerged May 9, 1941, only sixteen days after pupation of the larva which was collected on *Descurainia pinnata* at Dume Point, Los Angeles County. Is it possible that the majority of the *A. sara* spend only a few weeks in the pupal stage?

Since the male parent was unknown in every brood of *Anthocharis* with which I worked, no definite conclusions can be drawn. Only extensive breeding experiments can solve the problems involving *A. sara* and *reakirtii.*

8711 La Tuna Canyon Road, Sun Valley, Calif., U. S. A.

FIELD AND TECHNIQUE NOTES

UNUSUAL PUPATION SITE FOR *NYMPHALIS CALIFORNICA*

The accompanying photograph of *Nymphalis californica* (Bdv.) chrysalids shows pupation in a location and in concentrations not reported heretofore. The chrysalids are suspended from the underside of a hollowed piece of driftwood which when found was completely buried beneath the soil except for the knot-hole, upper left, which served as an entry for mature migrating caterpillars. The unusual location may have been induced by heavy parasitism prior to pupation. Not a single adult butterfly emerged, but instead there were hundreds of hymenopterous parasites. The specimen was collected early in August 1952 near Bucks Lake, Plumas County, California, by H. A. DOCKHAM, a resident of Berkeley.

Ordinarily pupation takes place on the bare defoliated twigs of several *Ceanothus* species on which the caterpillars feed. The chrysalids occur in large numbers suspended downward, but are rarely seen in such heavy concentrations as shown here. Defoliated brush-fields often quiver from the abdominal motion of these creatures when they are disturbed.

Nymphalis adult flights and caterpillar defoliations were unusually heavy throughout California mountainous areas this year.

GEORGE R. STRUBLE, Entomologist, U. S. Bureau of Entomology & Plant Quarantine
29 Forestry Building, University of California, Berkeley 4, Calif., U. S. A.

A MUTANT OF *STRYMON TITUS TITUS*

Among several specimens of *Strymon t. titus* Fabr. taken near Tremont, Porter County, Indiana, on July 6, 1952, there was one female with the typical lighter coloration and the clear white rings around the orange and black spots on the underside of the hind wings, that are characteristic of the southern subspecies *S. titus mopsus* Hbn. Indeed a close comparison with specimens of *mopsus* taken near Birmingham, Alabama, and near Stone Mountain, Atlanta, Georgia, the aberrant northern specimen proved to be indistinguishable from the southern type. Such occurrence seems to have some bearing on the problem of speciation.

HARRY SICHER, Loyola University School of Dentistry, Chicago 12, Ill., U. S. A.

INTERSPECIFIC MATING

Interspecific mating, though used frequently in genetic experiments, is fairly rare in the field. Only crosses between *Colias eurytheme* Bdv. and *C. philodice* Latr. are met often, but here the status of these two "species" is still controversial. It may, therefore, be of interest to report a case of mating between two species of Lycaeninae. July 2, 1952, on milkweed (*Asclepias*), a pair of Coppers was taken in copulation, that were soon diagnosed as a male Bronze Copper, *Lycaena thoë* Guérin, and a female American Copper, *L. phlaeas americana* Harris. It would be interesting to test for possible interspecific hybrids experimentally.

HARRY SICHER, Loyola University School of Dentistry, Chicago 12, Ill., U. S. A.

MOTHS FEIGNING DEATH

I had some small experiences August 24 with moths at light which may throw some light on this business of feigning death, as it is called.*

The first time I noticed this matter concerned *Nephelodes emmedonia* Cram., in 1949. Note that this insect appears here in September, rarely in late August.

Up until mid-August this year the weather has been hot most of the time, with warm nights, and I found no accidental incidents of feigning of death among any species taken at light on the screen or walls. The nights of August 22 and 23 this year were very cool: a little over 50° F. on the 23rd, on which night no moths showed up at lights; on the 24th, the day was warm, the sun hot, but at 10:30 P. M. the temperature was 60° F. Just a few moths were at light.

A species of *Leucania* was shoved into the jar by my finger without any struggle; I shook it back out, but it merely crawled, did not go "dead" but made no attempt to fly. A species of *Feltia* was even more lax; I picked it up with fingers, put it down, it lay still a second or two then crawled away, not trying flight, and I took it this way two or three times. A *Loxostege similalis* Guen. was on the window sill. They are usually quick to sense approach, and it is necessary to work fast to take them with the jar as a rule. I nudged this with my finger. It did not move. I simply picked it up with fingers and put it in the jar. It was a quite perfect specimen, though they are common enough here. The degree of day and night temperature seems indeed to be most important to life forces of these creatures. After a hot or warm day they obviously became slow and half dormant on a cool night. Thus *Utetheisa bella* L. during the hot days in Florida was very alert and hard to take by net, but at light it was attracted to lights on the buildings and was found resting on walls and sidewalks in numbers, quite easily picked up by hand and placed in a jar. Those which are fall species like *N. emmedonia*, usually flying or living on cool September nights, would suffer from the tendency to become dormant when at rest and perhaps have thus more quickly adopted the habit of lying quite still after dropping when disturbed. The habit obviously *differs in intensity in various species*, but without doubt is common to many if the circumstances are right. I believe this to be temperature reaction more than anything else.

H. E. WOODCOCK, 6115 Newport Avenue, Chicago, Illinois, U. S. A.

*See *Lep. News*, vol. 4: p. 46; vol. 6: p. 42.

REVIEWS

THE SATURNIIDAE OF THE WESTERN HEMISPHERE. MORPHOLOGY, PHYLOGENY, AND CLASSIFICATION. By Charles D. Michener. *Bulletin American Museum Natural History,* vol. 98: pp. 335-502, pl. 5, 420 text figs., 19 tables. 3 March 1952. Available from: American Museum of Natural History, New York 24, N. Y., U. S. A. in paper cover, $2.25.

It is a little odd that this group (Saturniidae and Citheroniidae, as usually understood) is one of the top families of Lepidoptera in general interest, knowledge of its biology and life history, and popularity in collections; and yet its broader classification has been presented to us only in scraps. For a long time we hoped that ROTHSCHILD and JORDAN would repeat for this group the kind of work they had done on the Sphingidae, but all that came out was on species and a couple of revisions of small groups. More came from BOUVIER, but again little to draw the work together into an overall pattern, and his series of papers, while eventually covering most of the Hemileucinae, were scattered where most American entomologists never saw them. When we heard that a group was at last to do the job, at least for America, with the help and encouragement of FRANK JOHNSON, we all looked forward to the result. But JOHNSON and ZIKAN are dead, COMSTOCK is inactive, and the present work may perhaps be all we shall get.

This is a very careful study of the adult structures of every American genus and major group of the double family, with enough of the related old-world types, so that only three or four more (*Nudaurelia, Decachorda, Eudaemonia,* and perhaps *Graellsia*) would have given us a world view of the major classification. We have a general discussion of the taxonomically useful structures, organ by organ, followed by page-long descriptions of the fifty genera and fifty further subgenera recognized, with drawings of the venation and genitalia of most of the type species. There is also a phylogeny, summing up what has appeared in previous papers. But this phylogeny must still be taken with great caution, for it is based wholly on the imaginal characters, almost all of which are degenerations; in fact the whole work is largely a study in degeneration. The early stages, which show far more in the way of progressive modifications, are hardly considered at all.

The work will also be of little use in the practical handling of material, for the keys are largely based on characters only uncovered by full dissection, among them the number of segments of the reduced palpi, the cones on the antennae, and the stage of reduction of the tarsal spining.

The concept of the size of genera is interesting; I wonder how some of the groupings will stand the test of further study. On the whole the work is neither "splitting" nor "lumping", but on a first view the scale does not seem consistent. For instance, *Automeris* and *Syssphinx* are subdivided, but *Saturnia* is kept nearly in the traditional sense, with *Calosaturnia, Agapema,* and *Eudia* standing as subgenera; and *Telea* does not even remain a subgenus against *Antheraea,* though *polyphemus* at least has a slightly distinct caterpillar. I have just rearranged the Cornell collection according to the new system, and to my eye part of the changes seem right, but part look a little odd and are, I suspect, based on over-emphasis of mere features of degeneration.

As to specific comments: The survival of a couple of spines on the penultimate segment of the female fore tarsus is of biological interest, for various Lepidoptera are known to identify their food-plants before ovipositing, by rasping the food with the fore tarsi (even the nearly vestigial fore tarsi of *Argynnis* and *Limenitis*), though I do not remember seeing this done by the Saturnids.

(P. 353). There seems to be some floating confusion as to the definition of the genitalic terms of anatomy; some workers when they say "uncus" mean only the slender prolongation, others use the term for the whole tenth tergite, when recognizable. MICHENER (and I) have been using it in the latter sense; some authors (among them ZANDER, as cited) limit the term to a free appendage, using the term "tegumen" for the combined 9th and 10th tergites. This explains some inconsistencies of statement. So it is with the "anellus or juxta"; morphologically two separate structures are involved: a sternal plate, with its various appendages, ob-

viously belonging to the body wall and in the proper position for a 9th furcisternum; and a ring about the penis, which is wide-spread in the insects, is developed from the reproductive system proper, and is actually the aedoeagus of embryologists, though systematists use the term differently in the Lepidoptera (*i.e.,* for the actual penis). The first of these sclerites is the juxta and the second the anellus, but they are often fused, and many workers confuse them (usually using the term anellus for the juxta, rarely the reverse). Michener also shifts the term gnathos. The transtilla is a structure of the 9th segment, articulating with the posterior (dorsal) process of the valve, while the gnathos is the tenth sternite, articulating with the junction of tegumen and uncus (or 9th and 10th segmental portions of the tegumen, under the more restricted definition of uncus). In fact both structures exist in some Saturnioids: the *g* of MICHENER'S figure 101 (*Asthenidia*) is the gnathos, the *g* of his *Rhescyntis* figures (116, 119) is the transtilla, the gnathos being reduced and not lettered, but shown as a pair of slender bars hanging down from the uncus.

The whole genitalic structure, not only of the early forms but in its manner of further development, is very suggestive of the Eupterotidae, and the connection may be closer than we have realized.

(P. 348). I feel that MICHENER does not do justice to the thorax, which is surprising in a hymenopterist. The pleural and anepisternal sutures of the mesothorax show much more extensive features than indicated, and they should be of great phylogenetic interest, for they are among the very few features of the imago that are not mere degeneration. The character making a primary subdivision of the group into Saturniids and Citheroniids **plus** Ludiinae, is not the position of the anepisternal suture, nor the condition of its posterior part, but the direction of its **anterior** part, which is plunging in the Citheroniids and Ludiinae, like the Bombycidae, Lasiocampidae, etc., but transverse in the rest of the Saturniids. On the other hand the position of the suture and resulting size of the anepisternum is a very useful character in further subdivision (*e.g.,* very high in *Hemileuca* and *Coloradia,* much lower in some *Automeris*), and the presence or absence of the posterior part may also be a useful character. Incidentally, it is a more convenient character than most of the ones MICHENER cites, for it can be seen merely by denuding a small spot on the thorax, without making a formal dissection. I suspect the sinuosity of the lower end of the pleural suture may also be of use. In the table on p. 356 the reference to the anepisternal suture should read "anteriorly" instead of "posteriorly".

(P. 356). In the table, on the primitive side, we read: "Flagellum without bristles". On examination I find the type 2 bristles in every form of which we have a slide. The only thing is that they are often shorter than the diffuse setae and easily overlooked if one does not consider their straightness and large socket. So that the character is merely one of slightly smaller and larger size, and I believe is not phylogenetically significant. Incidentally again, in the case of *Aglia* (p.359) they are not "absent" but rather notably large and strong.

(P. 362, middle of first column). In the Cercophanidae it is the base of R_1, not merely of R, which persists.

(P. 364). It seems not generally noticed that the horns of *Aglia* and the Citheroniids are not the same ones; in the Saturniids and Citheroniids which have two pair of enlarged horns they are on the meso- and metathorax, in *Aglia* on the pro- and metathorax. And this makes a possible further link between *Aglia* and *Polythysana*, for I think the latter is the only other Saturnioid, in which the prothoracic horns are the longer (Butler, *Trans. Ent. Soc. London* 1882: 104). If the odd bunch of spines on the "thirteenth segment" is actually on the anal plate, this will make a second and almost conclusive link with *Aglia.*

(P. 436, footnote). I think it is hardly correct to call *Jo* an **emendation** of *Io.* After all, scientific names are supposed to be Latin, even though the vagaries of the code have since 1912 or so distorted this into a very curious pseudolatin in some cases. But in HERRICH-SCHAEFFER'S time they were still Latin, and in Latin as also in the German of those days *I* and *J* were merely different forms of the same letter, hence it would be "impossible for Io and Jo to be synonyms" indeed, being the identical name. I also wonder about the rule of "tautonymy", for *Io* (i.e. *Jo*) cer-

tainly was intended to include the species *io*, even though not formally cited. And by the way, our Io moth is printed *Jo* by CRAMER.

(P. 469, near middle of second column). Read *pagenstecheri*.

(P. 477). Note that in the *Saturnia* group the larvae again give good evidence. In the true *Saturnia* and a few relatives the larva has bristly knobs, much like *cecropia* and even more like *Eupackardia calleta*. In *Dictyoploca* and *Caligula* they are densely hairy, and should certainly stand as a separate genus, though *Cricula* is somewhat transitional, with both knobs and hair. *Rhodinia*, which seems to belong with them superficially, clearly goes with *Antheraea*, etc., on early stages, with a dense (not lace) cocoon and an unpaired knob on the eighth segment of the abdomen. *Copaxa canella*, as figured by BURMEISTER, shows the long clubbed setae of *Saturnia pyri*, and we have its suitable lace cocoon.

(P. 409). Note that *Aglia* has two species, the Japanese *A. japonica* Leech, with a minute eyespot on the fore wing, being quite distinct from the mainland *A. tau*, with all eyespots very large.

(P. 499). I would certainly list *Callosamia* with three species, since *C. securifera* M. & W. (= *carolina* Jones) shows no sign of intergrading with *angulifera*.

WILLIAM T. M. FORBES
Department of Entomology, Cornell University
Ithaca, N.Y., U. S. A.

A REVISION OF THE GENUS ANNAPHILA *GROTE (LEPIDOPTERA, PHALAENIDAE)*. By Frederick H. Rindge & Claude I. Smith. *Bulletin American Museum of Natural History*, vol. 98: pp. 187-256, 8 figs. 30 Jan. 1952. Available from: American Museum of Natural History, New York 24, N. Y., U. S. A., in paper cover, $1.00.

This genus of beautiful little day-flying noctuids is becoming a collector's favorite (see Sala, in *Lep. News*, vol. 4: p. 71; 1951), but accurate determinations were not possible for most specimens until Dr. RINDGE finished this revision after the sad accidental death of Mr. SMITH in 1949. The revision is in the orderly style of all the RINDGE papers, with convenient tables of distribution and flight periods, keys to adult wings, and male and female genitalia, and full synomies and detailed descriptions of all species and subspecies. *Annaphila* is known only from western North America. In this revision the genus is subdivided into two subgenera, *Proannaphila* (new) and *Annaphila*. Of the nineteen species here recognized, six are described as new, and new subspecies are named for two others. The larvae of only four species are known, all described in this paper for the first time as a result of the careful work of WILLIAM H. EVANS. One new species is appropriately named for Mr. EVANS. Drawings illustrate the ♂ genitalia of eighteen species and the ♀ genitalia of all nineteen.

With this usable revision available there is an added incentive for field lepidopterists to take special care in watching for *Annaphila* in late winter and early spring, especially in western states other than California.

C. L. REMINGTON
Osborn Zoological Lab., Yale University
New Haven, Conn., U.S.A.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [Y.O.] - Y. OKADA; [C.R.] - C.L. REMINGTON; [J.R.] - J.E. REMINGTON; [T.S.] - T. SHIRÔZU. **A complete set of these pages for clipping and filing may be obtained for Vols. 4, 5, and 6 for $0.50 per volume.**

B. SYSTEMATICS AND NOMENCLATURE

Bernardi, G., "Les charactères distinctifs de trois *Pieris* français" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 60-62, 7 figs. "Mar.-Apr." [31 July] 1951. Characters of pattern and venation distinguishing *P. rapae, P. manni*, and *P. ergane*. [P.B.]

Gerhardinger, Klaus, "*Thais rumina* subspec. *minima* nov." [in German]. *Ent. Nachrichtenbl.*, vol. 3: pp. 101-103, 107, 2 figs. Feb. 1951. From Aranjuez, Spain [P.B.]

Gregor, František, & Dalibor Povolny, "The genus *Pleurota* Hb. in Moravia (Lep. Gelechiidae)" [in Czech and English]. *Acta Soc. Ent. Čechosloveniae*, vol. 47: pp. 38-41, 12 figs. 1 Feb. 1950. Key (in Czech) to the 4 spp.; describes and figures ♂ genitalia and discusses ecology. [P.B.]

Grey, L. Paul, "The subspeciation of *Speyeria atantis*." *Lep. News*, vol. 5: pp. 31-35. 1951.

Hata, Yoshihiko, "Genus *Lamproptera* Gray" [in Japanese]. *Butt. and Moths* (*Trans. Lep. Soc. Japan*), vol. 2: pp. 10-11. 1951. 2 spp. discussed and their genitalia figured. [Y.O.]

Herbulot, C., "Diagnoses de quatre nouveaux genres de Larentiinae paléarctiques (Geometridae)" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp., 62-63. "Mar.-Apr:" [31 July] 1951. Describes as new: *ANTILURGA* (type *Larentia alhambrata* Stgr.); *PAREULYPE* (*Geometra berberata* D. & S.); *PROTORHOE* (*Melanippe unicata* Gn.); *GRAMMORHOE (Geometra polygrammata* Bkh.). Genera based entirely on structure of ♂ genitalia; no figures. [P.B.]

Hoffman, Emil, "Zusammenfliegen von *Coenonympha arcania* L. und *satyrion* Esp." [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 121-123. 30 June 1947.

Howarth, T. G., "Prison camp entomology in the Far East." *Proc. Trans. So. London Ent. Nat. Hist. Soc.*, 1949-50: pp. 94-110, 3 pls. April 1951. Describes as new: *Apatele cerasi* (Chemulpho, Korea); figs. both sexes and ♂ genitalia. Describes, with some figs., early stages of *Epinanga borneensis, Xanthodes intercepta, Utetheisa lotrix* (foodplant *Tephrosia candida*), *Aporarandria specularia* (foodplant "mangosteen"). Lists spp. collected while in prison camps in Singapore and Korea. [P.B.]

Lempke, B. J., "The generic nomenclature of the European Pygaerinae (Lep., Notodontidae)." *Ent. Berichten*, vol. 13: pp. 332-333. 1 Sept. 1951. Prefers the name *Clostera* Sam. above *Ichthyura* Hb. Type of *Pygaera* is *timon* Hb. (designation of Kirby): *Phalera* Hb. remains for *bucephala* L. [A.D.]

Lempke, B. J., "The Schiffermüller Names". *Ent. Berichten*, vol. 14: pp. 92-94. 1 June 1952.

de Lesse, H., "Sur une espèce de Satyridae mal connue: *Hipparchia* (*Pseudotergumia*) *wyssii* Christ" [in French]. *Bull. Soc. Ent. France*, vol. 56: pp. 50-53, 3 figs. 1951. Redescribes sp.; figures ♂ genitalia of the 3 spp. of the subgenus. [P.B.]

de Lesse, H., "Divisions génériques et subgénériques des anciens genres *Satyrus* et *Eumenis* (sensu lato)" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 39-42. "Mar.-Apr." [31 July] 1951. Lists the following genera and subgenera, with type spp.: *Hipparchia: Hipparchia (fagi* Scop.), *NEOHIPPARCHIA*, new *(statilinus* Hufn.), *Pseudotergumia* (*fidea* L.); *ARETHUSANA*, new (*arethusa* Esp.); *Aulocera* (*brahminus* Blanch.); *Kanetisa: Kanetisa* (*digna* Marsh), Brintesia (*circe* Fabr.); *Karanasa* (*huebneri* Fldr.); *Minois* (*dryas* Scop.); *Satyrus* (*actaea* Esp.); *BERBERIA*, new (*abdelkader* Pierret); *PSEUDOCHAZARA*, new (*pelopea* Klug); *Chazara*

(*briseis* L.); *Neominois* (*ridingsii* Edw.). Lists spp. included in each genus. Study based on examination of generotypes of all genera referable to this group (spp. with spurs on mesothoracic tibiae). New genera briefly described. Resumé of a more extensive paper, to appear shortly. [P.B.]

Marion, H., "*Mecyna lutealis* Dup. bona species et f. *citralis* H.-S." [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 10-15, 4 figs. "Jan.-Feb." [31 Mar.] 1951. Distinguishes *M. lutealis* from *M. flavalis;* figures pattern and ♂ genitalia of both. [P.B.]

Munroe, Eugene, "Some remarks on the genus concept in Rhopalocera." *Lep. News.* vol. 3: pp. 3-4. 'Jan.' [Mar.] 1949.

Munroe, Eugene, "Subspeciation in the Microlepidoptera." *Lep. News,* vol. 5: pp. 29-31. 1951.

Okada, Yoshio, "Revised catalogue of the Theclinae (Lycaenidae) of Japan, Korea, Sakhalin, and Formosa." *Lep. News,* vol. 3: pp. 79-80. "Oct. [Nov.] 1949.

Paclt, Jiří, & Jiří Smelhaus, "On the representative of the genus *Philotes* Scudd. in Czechoslovakia" [in Czech, English summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 45-47, 3 figs. 1 Feb. 1950. Czech records of *P. baton* refer to *P. vicrama.* Valves of these 2 and of *P. panoptes* are described and figured. [P.B.]

Paclt, Jiří, "Les profits que la nomenclature zoologique pourrait tirer du scheme international de translitération applique aux noms cyrilliques" [in French]. *Proc. VIII Int. Ent. Congr.*: pp. 995-998. 1950. Proposes that the Rules be amended to direct the use of a uniform system for transliterating names derived from Russian and related languages. [P.B.]

Toxopeus, L. J., "Notes on the genus *Amathusia* (Lep., Rhop.)". *Idea,* vol. 9: pp. 9-23, pls. 1-3. 31 Dec. 1951. Revision of the five Javanese species, describes two as new: *duponti* (Buitenzorg) and *lieftincki* (Bantam); gives a key and photographs of upper and underside; adds critical notes on other spp. and describes also *A. lieftincki rosieri* subsp. nov. (Sumatra). [A.D.]

Toxopeus, L. J., "*Charaxes baya* (Moore) and *Charaxes scylax* Felder in Java (Lep., Nymphalidae)". *Idea,* vol. 9: pp. 27-28. 31 Dec. 1951. Two "forms" occurring side by side in Java apparently are distinct spp. [A.D.]

Toxopeus, L. J., "What is *Amathusia binghami* Fruhst.? (Lep., Rhop.)" *Idea,* vol. 9: pp. 28-31. 31 Dec. 1951. Proposes the following changes of names: *Amathusia phidippus binghami* Fruhst. (Malay Peninsula); *A. phidippus chersias* Fruhst. (as restricted by Corbet & Pendlebury); *A. ochrotaenia ochrotaenia* nom. nov. for *A. phidippus binghami* Fruhst. (Penang), wet season form (=*A. binghami* auctt. not Fruhst.); *A. ochrotaenia fruhstorferi* subsp. n. (West Coast of Sumatra) for *A. binghami* Fruhst., in Seitz, p. 429, part. [A.D.]

Toxopeus, L. J., "Nieuwe gegevens over *Papilio polytes* L." [In Dutch: new data on *P. p.*]. *Idea,* vol. 9: 38-39. 31 Dec. 1951. As is generally understood, females mimic *P.* (*Atrophaneura*) *aristolochiae.* This does not apply to the *polytes* subspecies from North Sumatra, female of which is extremely variable. Separates *Papilio polytes wagensveldi,* new subsp. (Atjeh). [A.D.]

Viette, P., "Sur la nomenclature des Eriocraniidae" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 43-44. "Mar.-Apr." [31 July] 1951. Discusses the taxonomic history of the group. Regards as valid the following genera, with type spp.: *Eriocrania* (*semipurpurella* Steph.); *Dyseriocrania* (*subpurpurella* Hw.); *Heringocrania* (*unimaculella* Zett.). *Mnemonica* a synonym of *Dyseriocrania.* [P.B.]

C. MORPHOLOGY AND CYTOLOGY

Pardi, L., "I primi processi dello sviluppo nell'uova fecondato delle razze tetraploidi-partenogenetiche di *Solenobia triquetrella* F.R. (Lepidoptera - Psychidae)" [in Italian, German summary]. *Chromosoma,* vol. 4: pp. 108-147, 25 figs. 1950. Describes fertilization and early cleavage stages, with emphasis on abnormalities of mitosis and chromosome number. [P.B.]

Seiler, J. & Barbara Gessner, "Die automiktischen Vorgänge im Ei der tetraploid parthenogenetischen *Solenobia triquetrella* F.R. (Psychidae, Lepid.)" [in German]. *Chromosoma,* vol. 4: pp. 91-107, 8 figs. 1950. Following reduction division the tetraploid chromosome number is restored by fusion of two nuclei. Other peculiarities and racial differences in cytology are described. [P.B.]

D. VARIATION AND GENETICS

Alexandre, R., "Notes et captures" [in French]. *Rev. Franç. Lépid.*, vol. 13: p. 64. "Mar.-Apr." [31 July] 1951. Describes a gynandromorph of *Erebia aethiops.* [P.B.]

Mauny, Jean, "Papillons inédits" [in French]. *Lambillionea,* vol. 49: p. 105. 25 Oct. 1949. Names an aberration of *Melitaea aurinia.* [P.B.]

Slabý, Otto, "*Erebia medusa* Fabr. from eastern Slovakia" [in Czech, English summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 48-52. 1 Feb. 1950. Local population belongs to *E. m. brigobanna.* Names an aberration. [P.B.]

Vigneau, Pierre, "Intéressantes captures en Gironde et dans les Pyrénées" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 147-149. "Sept.-Oct. 1949" [25 Jan. 1950]. Notes on 3 noctuids; names an aberration of *"Heodes" alciphron gordius.* [P.B.]

E. DISTRIBUTION AND PHENOLOGY

Adamczewski, Stanisław, "Notes on the Lepidoptera of Poland. II" [in Polish, English summary]. *Fragm. Faun. Mus. Zool. Polonici,* vol. 6: pp. 95-110. 15 July 1950. Notes on habits and distribution of 3 spp. of Noctuidae. *Melicleptria scutosa* and *Phytometra confusa* are new records for Poland. New localities in Poland recorded for 6 spp. [P.B.]

Antram, Chas. B., "Notes on the butterflies of the New Forest in 1950." *Ent. Rec.,* vol. 62: pp. 75-76. Sept. 1950.

Berger, L., "Espèces nouvelles pour la faune belge: *Scopula tesselaria* B. et *Cosymbia quercimontaria* Bastelb." [in French]. *Lambillionea,* vol. 49: p. 23. 25 Apr. 1949.

Boursin, Ch., "A propos de *Cucullia lactucae*" [in French]. *Rev. Franç. Lépid.,* vol. 11: pp. 398-399. "Oct.-Nov." [16 Dec.] 1948. Species is replaced in eastern Asia by *C. fraterna.* [P.B.]

Brčák, Jaroslav, "Poznámky k ekologii a fenologii píďalky. *Poecilopsis isabellae* Harr. (Lep. Geometridae)" [in Czech]. *Acta Soc. Ent. Čechosloveniae,* vol. 45: p. 77. 1 May 1948.

Cary, Margaret M., "Sphingidae collecting in north-central Venezuela in June, 1949." *Lep. News,* vol. 3: p. 78. "Oct." [Nov.] 1949.

Huard, G., "Une localité interessante du Morvan" [in French]. *Rev. Franç. Lépid.,* vol. 11: pp. 359-363. Sept. 1948. Notes on some Lepidoptera, mostly butterflies. [P.B.]

Hunt, Charles-J., "A propos de *Libythea celtis* Fuessly dans les Alpes Maritimes et sa bibliographie" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 217-218. "Jan.-Feb." [12 July] 1950.

Janmoulle, E., "Espèces nouvelles pour la faune belge" [in French]. *Lambillionea,* vol. 49: pp. 90-91, 110. 25 Oct., 25 Dec. 1949. Records *Dioryctria mutatella, Coleophora atriplicis, Elachista scirpi, Lypusa maurella, Dioryctria splendidella.* [P.B.]

Johnston, Edward C., "Lepidoptera of the Pribilof Island, Alaska." *Lep. News,* vol. 4: pp. 27-30. [June] 1950.

Justino, Irmão Gabriel, "Lepidopteros do Brasil Meridional. III" [in Portuguese]. *Bol. Inform. Inst. Geobiologico "La Salle" de Canoas,* no. 5; pp. 16-17. Apr. 1951. Records, with data, 30 spp. of butterflies. [C.R.]

Kaisila, Jouko, "*Coleophora tractella* Zell. (Lep. Oecophoridae) boreoalpin" [in Finnish, German summary]. *Ann. Ent. Fennici,* vol. 15: p. 42. 1949. New record for north Europe. [P.B.]

Komárek, Julius, "The vertical geographical migration of phytophagous insects (*Ips typographus* L., *Lymantria monacha* L., *Lecanium coryli* L., *Semasia diniana* Gn. etc.)" [in Czech, English summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 110-119. 1 Oct. 1950. *L. monacha, Epiblema tedella, E. nigricana, Cacoecia murinana* and *Semasia rufimitrana* have migrated vertically with new planting of their conifer hosts; *S. diniana* restricted to the original altitudinal zone, in spite of spread of its hosts. [P.B.]

Kudla, Miloslav, "Hřbetozubci (Notodontidae) z okolí Olomouce (Lep.)" [in Czech]. *Acta Soc. Ent. Čechosloveniae,* vol. 46: pp. 165-170. 1 Oct. 1949.

de Laever, E. "*Arenostola bondii* K. en Belgique?" [in French]. *Lambillionea,* vol. 49: p. 117, 25 Dec. 1949.

de Lattin, Gustav, "Über die zoogeographische Verhältnisse Vorderasiens" [in German]. *Verhandl. Deutsch. Zool., Marburg,* 1950: pp. 206-214, 7 figs. 1950. Discusses the origins of the fauna of western Asia, based on distribution of Lepidoptera. [P.B.]

Leech, M. J., "Lepidoptera in the Island of South Uist, Outer Hebrides. August 17-September 4, 1950." *Entomologist,* vol. 84: pp. 193-194. Sept. 1951.

Le Marchand, S., "Contribution à l'étude de la faune des microlépidoptères de la Gironde" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 104-111, 135-144. "May-June" [7 Dec.] 1949; "Sept.-Oct. 1949" [25 Jan. 1950]. Annotated list.

Lempke, B. J., "Belangrijke vangsten van Macrolepidoptera" [in Dutch: Important captures of M.] *Natuurhist. Maandbl.,* vol. 40: pp. 90-92. 31 Aug. 1951.

de Lesse, H., "*Scolitantides orion* Pallas et quelques Rhopalocères du Massif Central" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 58-60. "Feb." [2 Apr.] 1949.

de Lesse, H., "Sur la présence de reliques alpines dans la Drôme (*Melit. varia* Meyer-Dürr. et *Polyom. eros* Ochs.)" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 61-64. "Feb." [2 Apr.] 1949.

de Lesse, H., "Contribution à l'étude du genre *Coenonympha, C. arcania* et ses formes" [in French]. *Lambillionea,* vol. 49: pp. 68-80, 1 map. 25 Aug. 1949. Discusses the distribution of *C. arcania, C. darwiniana* and *C. gardetta;* the latter appear to be alpine representatives of *C. arcania.* [P.B.]

de Lesse, H., "Les races de *Pararge achine* Scop. en France et première capture de la forme typique à Gap" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 101-104, 1 pl. "May-June" [7 Dec.] 1949. *P. a. achine* and *P. a. laetalba;* figures adults. [P.B.]

Loritz, J., "Complément d'information sur *Catocala fraxini* L. près du littoral méditérranéen des Alpes-Maritimes" [in French]. *Rev. Franç. Lépid.,* vol. 11: pp. 402-412, 1 pl. "Dec. 1948 [10 Feb. 1949].

Loritz, J., "Sur la répartition verticale de quelques espèces de Lépidoptères dans les Alpes-Maritimes, les Hautes-Alpes et les Basses-Alpes" [in French]. *Rev. Franç. Lèpid.,* vol. 11: pp. 384-394, 413-420; vol. 12: pp.2-8, 69-81. "Oct.-Nov." [16 Dec.] 1948; "Dec. 1948" [10 Feb. 1949]; "Jan." [28 Feb.], "Feb." [2 Apr.], "Mar.-Apr." [4 Oct.] 1949. Extensive notes on the fauna of several localities in this area. [P.B.]

Loritz, Jean, "A propos de *Libythea celtis* Fuessly dans les Alpes-Maritimes et sa bibliographie" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 175-178. "Nov.-Dec. 1949" [26 Apr. 1950].

Loritz, Jean, "Sur la répartition géographique *d'Erebia epiphron aetherius* Esper dans les Alpes-Maritimes" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 246-250. "Mar.-Apr." [25 Sept.] 1950.

Maréchal, Paul "Insectes interessants récoltés par le Cercle des Entomologistes Liégeois" [in French]. *Lambillionea,* vol. 49: pp. 92-97. 25 Oct. 1949. Records 27 Lepidoptera. [P.B.]

Marion, H., "*Homoeosoma pseudonimbella* Bentk., (Phycitinae) nouvelle pour la France" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 173-175, 1 fig. "Nov.-Dec. 1949" [26 Apr. 1950]. Figures ♂ genitalia [P.B.]

Morley, A. M., "*Colias alfacariensis* Ribbe à Folkestone" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 155-156. "Sept.-Oct. 1949" [25 Jan. 1950].

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de Puységur, K., "*Erebia epistygne* Hübner dans le Gard et l'Hérault" [in French]. *Rev. Franç. Lépid.,* vol. 12: p. 216. "Jan.-Feb." [12 July] 1950.

Reisser, Hans, "Lepidopteren von den Aegäischen Inseln" [in German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 44-61. 30 June 1947. Annotated list.

Reisser, Hans, "Microlepidopteren aus der Sierra de Gredos"[in German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 109-112. 30 June 1947. Annotated list.

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de Ricci, D., "Notes complémentaires sur *Pericallia matronula*" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 21-23. "Jan.-Feb." [31 Mar.]1951. Distribution; appears to favor Jurassic formations. [P.B.]

Richard, F., "Espèces nouvelles pour la faune belge" [in French]. *Lambillionea*, vol. 50: pp. 14-15. 25 Feb. 1950. Records *Chlorissa cloraria* and lists differences from *C. viridata*. [P.B.]

Skala, Hugo, "Mitteilungen zur Falterfauna von Oberösterreich" [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 96-106. 30 June 1947. Annotated list.

Slabý, Otto, "Quelques dates faunistiques sur les Rhopalocères des montagnes de Orlické Hory (Bohéme du nord-est). (Lep.)" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae*, vol. 45: pp. 94-98, 2 figs. 1 May 1948. Notes on fauna; mostly butterflies. Figures 2 aberrations. [P.B.]

Smelhaus, Jiří, "Contribution to the knowledge of Sesiidae of Bohemia" [in Czech, English summary]. *Acta Soc. Ent. Čechosloveniae*, vol. 45: pp. 127-128. 1 Oct. 1948. Record of *Chamaesphecia affinis* refers properly to *C. empiformis*. [P.B.]

Smith, C. A. S., "The first records of European Corn Borer in Western Canada." *80th Ann. Rep. Ent. Soc. Ontario:* pp. 18-19. 1950. *Pyrausta nubilalis*.

Various authors, " The field season summary of North American Lepidoptera for 1948." *Lep. News*, vol. 2, suppl: pp. i-xii. '1948' [Apr. 1949.]

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Vlach, Vilém, "Contribution à la connaissance de la faune lépidoptérologique de la Bohême" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae*, vol. 47: pp. 60-61. 1 Feb. 1950. 1 new record (Zygaenidae) and 3 corrections. [P.B.]

Vlach, Vilém, "Further discoveries of microlepidoptera from Bohemia" [in Czech]. *Ann. Soc. Ent. Čechosloveniae*, vol. 47: pp. 192-193. 1 Oct. 1950. Records 21 spp. of *Nepticula*, 1 *Coleophora*, 1 *Euxanthis*. [P.B.]

Warnecke, G., "Auffallende Häufigkeit des Kiefernspinners (*Dendrolimus pini* L.) im Niederelbgebiet und Schleswig-Holstein" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: pp. 21-22. 1949.

Warnecke, Georg, "Einige Schmetterlingsfunde im Juni 1949 im Brunsholm (Stapelholm) und bei Schwabstedt (Kr Husum)" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: p. 35. 1949.

Warnecke, Georg, "Zur Ausbreitung des Tagfalters *Archnia* [sic] *levana* L. (Landkärtchen)" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: p. 36. 1949. Northward extension of range in central Europe. [P.B.]

Warnecke, Georg, "Zur Frage eines 'atlantischen' Klimakeils in Schleswig-Holstein und seines Einflusses auf die Tierwelt" [in German]. *Verh. Ver. f. Naturw. Heimatsforsch. Hamburg*, vol. 30: pp. 91-98, 9 figs. June 1949. The theory of a projection of "Atlantic" climate into N. Germany is not supported by the distribution of the fauna, particularly the Lepidoptera. [P.B.]

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Wichra, Jaroslav, "Nová naleziste v zácnějších druhů molylů v čecách" [in Czech]. *Acta Soc. Ent. Čechosloveniae*, vol. 46: pp. 172-180. 1 Oct. 1949. Annotated list.

Wolfsberger, Joseph, "Neue und interessante Macrolepidopterenfunde aus Sudbayern und den angrenzenden nordlichen Kalkalpen" [in German]. *Mitt. Münchn. Ent. Ges.*, vol. 35/39: pp. 308-329. 1 Aug. 1949. Notes on 123 spp. [P.B]

Zimmerman, Fr., & Hugo Skala, "Kleinfalter aus Mähren-Schlesien" [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 121-123. 30 June 1947. Annotated list.

F. BIOLOGY AND IMMATURE STAGES

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Bianchi, Fred A., "Recent changes in the parasite complex of armyworms." *Proc. Hawaiian Ent. Soc.,* vol. 13: p. 345. Mar. 1949. 3 recently introduced parasites of *Laphygma exempta* have replaced some older introductions in importance. [P.B.]

Burmann, Karl, "Abweichende Flugzeiten zweier *Titamio*-Arten (Microlepidoptera)" [in German] *Z. Wiener Ent. Ges.,* vol. 57: pp. 2-3. 30 June 1947. *T. schrankiana* and *T. phrygialis.*

Butcher, James W. & A.C. Hodson, "Biological and ecological studies on some lepidopterous bud and shoot insects of Jack Pine (Lepidoptera - Olethreutidae)." *Canad. Ent.,* vol. 81: pp. 161-173, 5 figs. July 1949. Life history, parasites and nature of damage caused by *Eucosma sonomana, Petrova pallipennis,* and *P. albicapitana.* [P.B.]

Cameron, Ewen, "The biology and economic importance of *Alomya debellator* (F.), a remarkable parasite of the swift moth, *Hepialus lupulinus* (L.)." *Bull. Ent. Res.,* vol. 41: pp. 429-438, 5 figs. Sept. 1950.

Cameron, Ewen, "On the identity of an ichneumonid parasite of *Hepialus lupulinus* (L.)." *Bull. Ent. Res.,* vol. 41: p. 637. Feb. 1951. Parasite identified in a previous paper as *Alomyia debellator* is actually *Ichneumon suspiciosus.* [P.B.]

Cardew, P.A., "Notes on protective resemblances in the Order Lepidoptera." *Proc. So. London Ent. Nat. Hist. Soc.,* 1948-49: pp. 61-68. Feb. 1950. Deals principally with cryptic coloration. [P.B.]

Chada, Harvey Lorenzo, "Seasonal development and ecology of the European Corn Borer in the upper Mississippi Valley." *Wisconsin Univ. Sum. Doctoral Diss.,* vol. 9: pp. 74-76. 1949.

Chang, Joseph T., "A preliminary survey of tobacco insects in Sian." *Peking Nat. Hist. Bull.,* vol. 16: pp. 279-289. Mar.-June 1948. Morphology and biology of 3 spp. of *Heliothis* and 1 *Crambus;* 10 other noctuids recorded. [P.B.]

Franklin, Henry J., "A new cutworm on cranberry." *Journ. Econ. Ent.,* vol. 42: p. 986, 3 figs. Dec. 1949. Describes larva, cocoon and adult of *Hyppa xylinoides,* with poor figures. [P.B.]

Gómez Clemente, Federico, "Estudio biológico del lepidoptero *Chilo simplex* Butl. en los arrozales valencianos" [in Spanish]. *Bol. Patol. Veg. Ent. Agric.,* vol. 16: pp. 1-22, 8 figs. 1949. Biology and morphology of all stages. [P.B.]

Graham, A. R., "Developments in the control of the Larch Case Bearer, *Coleophora laricella* (Hbn.)." *78th Ann. Rep. Ent. Soc. Ontario*: pp. 45-50. 1949. Biology of 2 parasites. [P.B.]

Grandori, Remo, "Un nuovo nemico del gelho e delle piante da frutto: *Hyphantria cunea* Drury" [in Italian]. *Boll. Zool. Agr. Bachic.,* vol. 15: pp. 3-9, 4 figs. 1949. Morphology and biology of this introduced American speices. [P.B.]

Guppy, Richard, "Some records of parasitic Diptera from Wellington, B. C." *Proc. Ent. Soc. Brit. Columbia,* vol. 46: p.4. 15 May 1950. Records 4 parasites of Lepidoptera (Phalaenidae, Arctiidae, Lasiocampidae). [P.B.]

Hill, A. R., "The Bionomics of *Lampronia rubiella* (Bjerkander), the Raspberry Moth, in Scotland." *Journ. Hortic. Sci.,* vol. 27: pp. 1-13, 1 pl. Jan. 1952:

Hofmaster, Richard Namon, "Biology and control of the Potato Tuberworm with special reference to eastern Virginia." *Ohio State U. Abs. Doct. Diss.,* no. 57: pp. 93-101, 4 figs. 1949.

House, H. L., & M. Gladys Turner, "An artificial food for rearing *Pseudosarcophaga affinis* (Fall.), a parasite of the Spruce Budworm *Choristoneura fumiferana* (Clem.)." *79th Ann. Rep. Ent. Soc. Ontario*: pp. 50-53. 1949. Parasites reared on liver and fish mixture. [P.B.]

Janmoulle, E., & L. Berger, "Remarques sur la faune belge" [in French]. *Lambillionea,* vol. 49: pp. 57-58. 25 June 1949. Habits of larva of *Teichobia verhuellella;* food plant *Scolopendrium.* Records of 18 other spp. [P.B.]

Janmoulle, E., "Remarques sur la faune belge" [In French]. *Lambillionea,* vol. 50: p. 59. 25 June 1950. *Eupithecia oblongata* on *Statice limonium* and *Artemisia maritima.* [P.B.]

Jones, J. R. J. Llewellyn, "Notes on rearing, from larvae, *Sarbena* (*Roeselia*) *minuscula* Zell." *Proc. Ent. Soc. Brit. Columbia,* vol. 46: p. 41. 15 May 1950. Reared on oak, but lichen must be present also. [P.B.]

Kautz, Hans, "Bemerkungen zum Aufsatz von Emil Hoffman in Linz Eine II. Generation von *Pieris bryoniae* O. in Salzburg?" [in German]. *Z. Wiener Ent. Ges.,* vol. 57: pp. 42-43. 30 June 1947.

Keifer, H. H., "Systematic entomology." *Bull. Calif. Dept. Agric.*, vol. 37: pp. 205-209. Oct.-Nov.-Dec. 1948. Habits of *Apterona crenulella;* the sp. appears to be parthenogenetic in California, as no adults have ever been seen to emerge. [P.B.]

Kerzina, M. N., "Massovoe pramnozheniedubovï khokhlatki (*Notodonta trepida* Esp.) i istreblenie ee ptitsami" [in Russian; Mass reproduction of *N. trepida* and its extermination by birds]. *Isvest Akad. Nauk. SSSR, Ser. Biol., 1949:* pp. 317-322, 1 fig.

Klimesch, Josef, "*Brachmia arulensis* Rbl. (Lep. Gelechiidae)" [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 65-72, 1 pl., 11 figs. 30 June 1947. Describes all stages and biology; well illustrated. [P.B.]

Klimesch, Josef, "Die Lebensweise der Raupe von *Xanthospilapteryx magnifica* Stt. (Lep., Gracilariidae)" [in German]. *Z. Wiener Ent. Ges.*, vol. 57: pp. 74-80, 1 pl., 11 figs. 30 June 1947. Distribution; structure and biology of early stages. [P.B.]

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Le Charles, L., "Sur le comportement d'une chenille de *Cucullia lactucae* Esper. (Lepidopt. Noctuinae)" [in French]. *Rev. Franç. Lépid.*, vol. 11: pp. 355-356, 1 pl., 1 map. Sept. 1948. Distribution in France; larval habits. Larva figured. [P.B.]

Legay, Jean-Marie, & Michel Pascal, "De l'effet de groupe chez le ver à soie" [in French]. *C. R. Acad. Sci.*, vol. 233: pp. 445-447, 1 fig. 30 July 1951. Concentration of larvae has slight effects in last instar only. [P.B.]

Le Marchand, S., "Sur une particularité biologique inédite chez une espèce nouvelle de *Stigmella* (*Nepticula*)" [in French]. *Rev. Franç. Lépid.*, vol. 11: pp. 347-349. Sept. 1948. Pupation habits of *S. phyllotomella.* [P.B.]

Rougeot, P.C., "Description des premiers états de *Lobobunaea goodi* Holl." [in French]. *Bull. Mens. Soc. Linn. Lyon,* vol. 18: pp. 42-43. Apr. 1949. Describes full-grown larva and pupa. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Anderson, E. C., "Mating Habits of Soil Webworms." *Journ. Econ. Ent.*, vol. 43: p. 956, 1 fig. Dec. 1950. *Crambus dorsipunctellus.*

Betz, J.-T., "Éclosions diférées et paradoxales chez *Smerinthus ocellata atlanticus* Aust." [in French]. *Rev. Franç. Lépid.*, vol. 12: pp. 156-160. "Sept.-Oct: 1949" [25 Jan: 1950]. Effectiveness of thermal shock in breaking diapause. [P.B.]

Busnel, René-Guy, "Nouvelle acquisitions sur les pterines des insectes" [in French]. *Proc. VIII Int. Ent. Congr.*, pp. 622-625. 1950. Report on recent work on this group of pigments, characteristic of the Pieridae. [P.B.]

Dreux, Ph., "Influence des ions K et Ca sur l'automatisme du vaisseau dorsal de la chenille de *Galleria mellonella* L." [in French]. *C. R. Soc. Biol.*, vol. 144: pp. 803-804. June 1950.

Dreux, Ph., "Action de la concentration totale des solutions sur l'automatisme du vaisseau dorsal de la chenille de *Galleria mellonella* L." [in French]. *C. R. Soc. Biol.*, vol. 144: pp. 804-806, 1 fig. June 1950.

Drilhon, Andrée, and René-Guy Busnel, "Discrimination des acides aminés libres dans l'oeuf de *Bombyx mori* L." [in French]. *C. R. Acad. Sci.*, vol. 230: pp. 1114-1116. 13 March 1950.

Fukaya, M., "On the factor inducing the dormancy of the rice borer, *Chilo simplex* Butler." *Proc. VIII Int. Ent. Congr.*, pp. 223-225. 1950. Dormancy in 5th instar larva partly determined by conditions of temperature, and perhaps light, under which the egg is kept. [P.B.]

Jahn, Theodore, & Lewis A. Kaplan, "Effect of carbon dioxide on insect electroretinograms." *Anat. Rec.*, vol. 105: p. 577. Nov. 1949. Abstract; *Celerio lineata, Papilio daunus.*

van der Kloot, William, & Carroll M. Williams, "An experimental analysis of the spinning behaviour of the Cecropia silkworm." *Anat. Rec.*, vol. 108: pp. 511-512. Nov. 1950. Abstarct only.

Passonneau, Janet V., & Carroll M. Williams, "The moulting-fluid of the Cecropia silkworm." *Anat. Rec.*, vol. 108: p. 558. Nov. 1950. Abstract only.

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Svetlov, P. G., & O. V. Chekanovskaia, "O prirode ralichiĭ v chuvstvitel'nosti k vrednym faktoram v samtsor i samok. Opyty s imaginal'nymi diskami gusenits *Dasychira* sp." [in Russian; on the nature of the differences in sensitivity to injurious agents in ♂♂ and ♀♀; experiments with imaginal disks of *Dasychira* sp.]. *Isvestia Akad. Nauk SSSR, Ser. Biol.* 1949: pp. 201-207.

Telfer, William H. & Carroll M. Williams, "An immunological study of the larval-pupal transformation of the Cercropia silkworm." *Anat. Rec.*, vol. 108: p. 559. Nov. 1950. Abstract only.

H. MIGRATION

Lempke, B. J., "The migrating Macrolepidoptera of Holland in comparison with those of Great Britain." *Proc. So. London Ent. Nat. Hist. Soc.*, 1948-49: pp. 148-158: Feb. 1950. summary of progress in recording migrants in Holland; notes on 37 spp. Holland evidently much poorer in migrants than Britain. [P.B.]

Loeliger, R., "The migration observation group of Switzerland." *Lep. News*, vol. 4: pp. 61-62. "1950" [Mar. 1951].

Rawson, George W., "A migration of the Snout Butterfly (*Libytheana bachmanii*) in eastern Arizona." *Lep. News*, vol. 3: p. 28. "Mar." [May] 1949.

Warnecke, G., "Ein Schmetterlingswanderzug am 12.V.1949. bei Hamburg und auf der Unterelbe" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: pp. 20-21. 1949. *Pieris brassicae* migrating. [P.B.]

Warnecke, Georg, "Wanderzug des Grossen Kohlweisslings (*Pieris brassicae* L.) am 23 und 24 Juli 1949 bei Hamburg" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: pp. 32-33. 1949.

Warnecke, Georg, "Einflug des Distelfalters (*Pyrameis cardui* L.) 1949" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.*, n.s., vol. 2: pp. 33-34. 1949.

I. TECHNIQUE

Anonymous, "Collecting Insects." *Life*, vol. 32: pp. 62-66, 13 figs., 1 col. pl. 16 June 1952. Brief elementary instructions on collecting, killing, and mounting insects. [J.R.]

Klots, Alexander B., "Back-yard butterflies for young collectors." *Family Circle*, vol. 41: pp. 38-41, 58-62, 11 figs., 2 col. pls. July 1952. Popular article with suggestions for starting a Lepidoptera collection, including equipment, "hunting seasons", attracting butterflies, life history, unusual habits. [J.R.]

Le Charles, L., "Comment tuer les Zygènes" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 33, 38, 55, 63. "Mar.-Apr." [31 July] 1951. Recommends use of carbon tetrachloride or a pin dipped in nicotine solution. [P.B.]

J. MISCELLANY

Beirne, Bryan P., "Some original paintings by John Abbot." *Lep. News*, vol. 4: pp. 25-26. [June] 1950.

Bryk, Felix, "Der Gattungsbegriff bei Linné" [in German]. *Proc. VIII Int. Ent. Congr.*, pp. 989-992. 1950. Discusses Linnaeus' genera, especially in the Lepidoptera, and some other peculiarities of 'binomial nomenclature'. [P.B.]

Clarke, J. F. Gates, "The date of "A List of North American Lepidoptera" by Harrison G. Dyar." *Proc. Ent. Soc. Wash.*, vol. 52: p. 308. 13 Dec. 1950. The actual date of publication was 13 Jan. 1903. [P.B.]

Clench, Harry K., "Regional lists." *Lep. News*, vol. 3: pp. 15-16. 'Feb.' [Apr.] 1949.

Hyde, George E., "A lost British butterfly." *Country Life*, vol. 107: p. 1027, 3 figs. 1950. *Aporia crataegi.*

Meiners, Edwin P., "A brief history of lepidopterology in Missouri." *Lep. News*, vol. 3: pp. 51-52. "Apr.-May" [July] 1949.

Pistorius, Anna, *What Butterfly Is It?* 25 pp.; ill. Wilcox and Follett Co., New York. 1949.

Reichel, Johannes, "Collecting on the Peloponnesus of Greece." *Lep. News*, vol. 4: p. 47. "1950" [Mar. 1951].

Remington, P. S., Jr., & J. Donald Eff, "A collecting trip in search of *Speyeria egleis secreta*." *Lep. News*, vol. 2: pp. 91-92. Nov. 1948.

NOTICES

For sale: **Indian and a few Sumatran Lepid.** in papers with data. Prices reasonably low, material in good condition. Edward C. Welling, 700 E. 240th St., Euclid 23, Ohio, U.S.A.

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LIVING MATERIAL

Wanted urgently: pupae of *Papilio bairdi, P. zelicaon, P. brevicauda,* and *P. nitra.* Good prices paid or will exchange for British species. Apply Dr. C. A. Clarke, High Close, Thorsway, Caldy, Cheshire, ENGLAND.

For sale, 50 living **cocoons of *Actias selene*** at reasonable prices. Edward C. Welling, 700 E. 240th St., Euclid 23, Ohio, U.S.A.

Wish to purchase living cocoons of Ceropia and Polyphemus moths and spread tropical Rhopalocera. L. Dalkoff, Box 32, Rock Island, Ill., U.S.A.

Needed: pupae or ova of *Papilio zelicaon, bairdi, indra,* and *brevicauda* for study of inter-specific relationships in the *Papilio machaon* complex. Will buy or offer in exchange living or papered specimens of southeastern Saturniidae and Papilionidae. Inquiries invited. John P. Knudsen, Division of Natural Sciences, Oglethorpe University, Georgia, U. S. A.

MINUTES OF THE SECOND ANNUAL MEETINGS OF THE LEPIDOPTERISTS' SOCIETY

The meetings were held on Friday and Saturday, 28-29 December 1951, at the Chicago Natural History Museum in Chicago, Illinois. A total of thirty-two members and guests were present and signed the attendance book. All formal sessions were held in the Lecture Hall of the Museum.

In the absence of President McDUNNOUGH, C. L. REMINGTON called to order the opening session on Friday morning. Colonel CLIFFORD C. GREGG, Director of the Museum, gave a cordial address of welcome to Society members. Next, WILLIAM J. GERHARD, Curator Emeritus of the Museum's Division of Insects, spoke delightfully and at some length about the history of Lepidoptera accessions in the Museum, with particular attention to the acquisition of the Strecker Collection. The session was then adjourned, and the remainder of the morning was devoted to an informal tour of the Lepidoptera collections under the guidance of Mr. GERHARD and AUGUST A. ZIEMER of the Division's staff.

The first item on the afternoon program was the annual business meeting of the Society. Members F. R. ARNHOLD, E. W. FAGER, T. N. FREEMAN, D. H. KISTNER, R. LEUSCHNER, W. S. McALPINE, A. L. McELHOSE, A. H. MOECK, L. S. PHILLIPS, F. W. PRESTON, C. L. REMINGTON, P. S. REMINGTON, V. G. SASKO, W. H. SCHOENHERR, H. SICHER, A. L. THRONE, G. R. WREN, and A. K. WYATT were present. Dr. FREEMAN, of the Executive Committee, was elected presiding officer of the meeting. Dr. REMINGTON served as recording secretary. The minutes of the 1950 meeting held in New York (see *Lep. News,* vol. 5: pp. 1-3) were read and approved. Results of the balloting for 1952 officers were announced. The nominees for the six offices to be filled were duly elected, essentially unanimously on the 108 ballots cast. The five distinguished lepidopterists nominated for Honorary Membership, G. D. HALE CARPENTER, W. H. EVANS, W. T. M. FORBES, KARL JORDAN, and J. H. McDUNNOUGH, were unanimously elected by postal canvass of the members of the Society.

Dr. SICHER reported for the Auditing Committee that he had examined the financial reports of the Treasurer, given below, and the Editor-in-Chief and found their calculations correct. [The Chairman of the Committee, S. A. HESSEL, was unable to attend the meeting but he later examined in detail the books of the Treasurer and the Editor-in-Chief and reported them correct.]

Report of the Treasurer for the Period—
December 29, 1950 to December 3, 1951

Receipts			
Cash on hand from 1950 operations		$ 378.95	
Dues, subscriptions, miscellaneous		1,099.95	
Registration fees for 1950 Annual Meeting		29.00	
Total		$1,507.90	$1,507.90
Disbursements			
Lepidopterists' News—printing costs		$ 766.20	
Expenses of Editor's Office (including Lep. News mailing costs)		319.73	
Expenses of Secretary's Office		32.35	
Expenses of Treasurer's Office			
Stationery and bill forms	$34.25		
Postage stamps, miscellaneous	16.43		
Total	$50.68	50.68	
Society Meetings			
Annual Meeting. New York. December 29-30, 1950	$29.08		

Special Meeting in conjunction with IXth International Entomological Congress. Amsterdam. August 21, 1951	34.00		
Total	$63.08	63.08	
Banking Costs		7.32	
Reimbursement of overpayments		7.33	
Grand Total		$1,246.69	1,246.69
Balance			$ 261.21

Dr. REMINGTON then read the annual report of the Editor-in-Chief, as follows:

"In this, the first annual report of the Editor-in-Chief of THE LEPIDOPTERISTS' SOCIETY as formally constituted 30 December 1950, it seems desirable to take stock of some aspects of the Editor's activities prior to formal constitution of the Society.

"During the winter of early 1947, HARRY K. CLENCH and I gradually matured plans for an informal periodical with the joint aims of drawing together the loose fraternity of individuals interested in any aspect of the study of Lepidoptera, and in particular arousing in lepidopterists without biological training an interest in scientific investigation of the phenomena of the life of Lepidoptera. The purpose was not and is not to discredit or suppress the practice of collecting for its own sake, but rather to acquaint collectors with biological knowledge so that those possibly inclined to develop a scientific approach to their collecting would have the pleasure of understanding their insects and even advancing fundamental knowledge themselves. From a survey of the results at the end of the fifth year, it is encouraging to note that this facet of the functioning of the Society has been successful to a surprising degree.

"It was felt from the beginning that the periodical should serve as the organ of a society and that subscribers would be inclined to participate in the project and support it most strongly as members rather than passive subscribers.

"After circularizing as many North American lepidopterists as our sources of addresses allowed, we began issuing *The Lepidopterists' News* as a monthly mimeographed journal. Mrs. REMINGTON made the stencils, and Mr. CLENCH and I did the actual mimeographing. Four numbers were issued by our co-editorship. Early in the fall of 1947, when Mr. CLENCH left Cambridge, Massachusetts, all the administration of the Society and editing of the periodical fell to Mrs. REMINGTON and me. This combined duty was taxing enough at first, but as the Society and the *News* grew steadily it became overwhelming. The *News* fell steadily farther behind schedule, and it was impossible to attend properly to all of the correspondence. Mr. CYRIL F. DOS PASSOS at length agreed to draft a constitution and by-laws, so that the Society could be formally constituted and the administration of its affairs be assumed by several members. This of course had other important purposes than dividing our labor. A group of *pro tem.* officers served during the fall of 1950, and they were duly elected, along with the other constitutional officers, for the present year. The transition is not yet complete, but we have been able to devote ourselves largely to editorial affairs.

"The medium for publication of the *News* remains a major problem. Members will recall that after the first, mimeographed, volume the *News* has been printed by the offset process. The advantages of this over mimeographing are many. However, the major advantage of offset over regular letterpress printing is economy. The editorial labor with offset is unjustifiably time-consuming, and a carefully trained typist must be available. For two primary reasons I propose that the *News* should be published by the letter-press process, beginning with the next volume, Vol. VI: a) it is essential that the time required to edit the *News* be reduced to the amount for letter-press issues; b) the complexities as well as time involved in editing the *News* by offset would hardly be acceptable to any competent lepidopterist who could be induced to become the next Editor-in-Chief.

"My proposal would be to publish five forty-page issues per year, the *News* appearing bimonthly except during the summer. This would bring the pages per volume up to 200 (the present total is generally about 100). To support this doubled number of pages, it would be necessary to raise society dues only one dollar. Sustaining Members would continue to pay a minimum of five dollars per year; the reduced gap between Regular and Sustaining membership might be expected to increase the number of Sustaining Members.

"During the past year the *News* has finally returned to scheduled publication dates. The last issue, devoted principally to the annual Season Summary, is expected to appear in January or early February. The Editorial Board as prescribed by the Constitution is gradually being filled out. The four Associate Editorships have now been filled, all by able and devoted people. Mr. BELLINGER'S management of the literature abstracting has been particularly fine. As always, we have attempted to have all areas of interest well represented in the *News* pages. A particular feature of the current volume has been the publication in full of the symposium on Geographic Subspeciation in the Lepidoptera, which was presented at the New York meetings. There have been many favorable comments, both from Society members and from professional zoologists not members of the Society."

Dr. SICHER'S motion that the Executive Committee be urged to authorize the recommended printing changes was seconded and carried unanimously.

Dr. REMINGTON read the first annual report of the Librarian, as follows:
"The Society Library is at present inactive except as a repository for accessions. As soon as a regular Librarian can be found, with suitable location and facilities, the literature will be made available for loan to Society members. Meanwhile the literature is kept in the Osborn Zoological Laboratory.

"At present, the Library contains over 250 reprints of papers on Lepidoptera, including most or all papers on Lepidoptera which have appeared in *Treubia, Arbeiten der Morphologische und Taxonomische Entomologie* (Berlin-Dahlem), and *Arbeiten der Physiologische und Angewandte Entomologie* (Berlin-Dahlem). We are receiving by exchange for *The Lepidopterists' News* the following periodicals:

Annales Musei Zoologici Polonici (Vols.12-14 and earlier Lepid. papers)
Butterflies and Moths (Japan) (Vol.1-2)
Coleopterists' Bulletin (Vols. 1-5)
Casopis (Czechoslovakia) (Vols.44-47)
Entomological News (Vols.58-62)
Entomologische Berichten (Netherlands) (Vols.12-13)
Entomologisches Nachrichtenblatt (Switzerland)
Entomologisk Tidskrift (Sweden) (Vols.68-72)
Fragmenta Faunistica (Poland) (Vols.5-6 and earlier Lepid. papers)
Lambillionea (Belgium) (Vols. 47-50)
Lepidoptera (Denmark) (Vols.1946-1951)
Matsumushi (Japan) (Vol.3)
Mitteilungen der Faunistischen Arbeitsgemeinschaft (Germany) (Vols.1-4)
Mitteilungen der Münchner Entomologischen Gesellschaft (Germany) (Vols.33-40)
Revue française de Lépidoptérologie (France) (Vols.11-13)
Wasmann Journal of Biology (Vols.3-9)
Zeitschrift der Wiener Entomologischen Gesellschaft (Austria) (Vols.56-62)
Zentralstelle d. Beobachter der Schmetterl.-Wanderflugen (Switzerland) (Nos.20-34)

In addition, there are single or a few numbers of several other periodicals."

There were animated discussions of the questions of paid advertising in the *News*, introducing a specimen-exchange at meetings, holding the annual meetings during the summer in attractive collecting territory, a field study group connected with the summer meeting, and other Society affairs.

Following the business meeting Dr. FREEMAN presided at a session of general papers, as follows:

1. Monarch Butterfly Observations during 1951. C. A. ANDERSON, Dallas, Texas (read by D.H. KISTNER).
2. An Encyclopedic Bibliography of the Described Transformations of some North American Lepidoptera; plan of the book. HARRISON M. TIETZ, State College, Pennsylvania (read by C. L. REMINGTON).
3. Salmon's Fluid, a new Mounting Medium for Slides of Small Larvae and Larval Pelts of Lepidoptera. PETER F. BELLINGER, New Haven, Connecticut (read by E. W. FAGER).
4. Hybrid Sterility as the Speciation Key in the Lepidoptera. CHARLES L. REMINGTON, New Haven, Connecticut.

On Friday evening we joined the Chicago Entomological Society for dinner in a restaurant near the Museum and then returned to the Lecture Hall for the Illustrations Session, devoted primarily to a fine film, "The Life History of the Monarch", by LEON F. URBAIN.

The Saturday morning session was a round-table discussion on "Techniques and Objectives of Rearing Lepidoptera", led by DR. REMINGTON and with papers by ALEX K. WYATT and WILLIAM H. EVANS (read for MR. EVANS). There was active participation by members in attendance.

The final session, on Saturday afternoon, with Dr. REMINGTON presiding, was another program of general papers, as follows:

1. The Distribution of the Tortricid Subfamily Sparganothidinae. ROBERT LAMBERT, Ottawa, Canada (read by T. N. FREEMAN).
2. A New Altitudinal High for *Erora laeta.* SIDNEY A. HESSEL, Woodmere, New York (read for Mr. HESSEL).
3. Butterfly Collecting 500 Miles from the North Pole (with Kodachrome slides). PAUL F. BRUGGEMANN, Ottawa, Canada (read by T. N. FREEMAN).
4. Collecting along the Alaskan Highway. P. S. REMINGTON, St. Louis, Missouri.
5. Facies of Butterfly Distribution in the Canadian North (with Kodachrome slides). T. N. FREEMAN, Ottawa, Canada.
6. Studies of Michigan Butterflies. W. S. MCALPINE, Birmingham, Michigan.

During the two days of meetings the Society had on display a collection of high-quality photographs by C. A. ANDERSON, ALICE L. HOPF, L. QUITT, and C. L. REMINGTON, beautiful original paintings by C. M. DAMMERS, specimens from C.A. ANDERSON and C. L REMINGTON, and selected Museum Lepidoptera.

Arrangements for the facilities and many other tasks were handled principally by HENRY S. DYBAS, curator in the Division of Insects. He and Mr. WYATT, Chairman of the Local Arrangements Committee, also including Dr. FAGER, Mr. MOECK, and Mr. WREN, arranged superb facilities which greatly promoted the success of the meeting. Mr. DYBAS was responsible for the original invitation that the meetings be held in the Chicago Natural History Museum. In spite of a great blizzard, the attendance was good. In addition to the members listed above for the business meeting, the following members and guests were present at certain sessions: M. L. BRISTOL, H. S. DYBAS, W. J. GERHARD, F. E. HOLLEY, ELSEY MERRIAM, H. G. NELSON, E. RAY, LILLIAN ROSS, C. SIEVERS, BURKE SMITH, P. SURANY, L. F. URBAIN, F. G. WERNER, J. E. WOMBLE, A. A. ZIEMER:

Respectfully submitted

C. L. REMINGTON, Acting Secretary

THE LEPIDOPTERISTS' SOCIETY
LIST OF MEMBERS

December 1952

The list is arranged alphabetically by nations within each continental area, and by states or provinces in the U. S. A. and Canada. State, province, and nation names are here omitted in the address of each member. The address is followed by the lepidopterological interests. Where only "RHOP.", "MACRO.", or "MICRO." appears, the interest is general within the respective group. "LEPID." is used where interests include all three of the above groups. Following the interests among taxonomic groups are the other aspects of lepidopterology in which the member is interested. The member's name preceded by an asterisk (*) indicates Charter Membership; his name in capital letters indicates Sustaining Membership. The word "Nearctic" here means America north of Mexico. For uniformity "Phalaenidae" is used for all cases, even though the equivalent name "Noctuidae" had been placed on the membership card by some members. Similarly, *Speyeria, Boloria,* etc. are used for the Nearctic species formerly placed in *Argynnis, Brenthis,* etc. The following abbreviations are used:

LEPID.	— All Lepidoptera	esp.	— especially
RHOP.	— Rhopalocera (butterflies)	Coll.	— Collection
MACRO.	— Macroheterocera (moths)	Ex.	— Exchange
MICRO.	— Microlepidoptera (moths)		

HONORARY LIFE MEMBERS

"Individuals, not exceeding ten in number, who have made important contributions to the science of lepidopterology, may be elected Honorary Members of the Society."

(Constitution, Art.III, Sec.7.)

Prof. G. D. HALE CARPENTER, Hope Department of Entomology, Oxford University, Oxford, England, U.K. (Rhopalocera; Mimicry)

Brig. W.H. EVANS, Department of Entomology, British Museum (Natural History), London S.W. 7, England, U.K. (Hesperiidae)

*Prof. WM. T. M. FORBES, Department of Entomology, Cornell University, Ithaca, N. Y., U.S.A. (Lepidoptera: Classification; Biogeography)

*Dr. KARL JORDAN, Zoological Museum, Tring, Herts., England, U.K. (Papilionidae, Sphingidae, Saturniidae)

*Dr. JAMES H. McDUNNOUGH, Nova Scotia Museum of Science, Halifax, N.S., Canada. (Nearctic Lepidoptera)

AFRICA

BELGIAN CONGO

Seydel, Charles, B.P. 712, Elisabethville. LEPID: esp. African. Coll. Sell.

GOLD COAST

Johnson, F. L., United Africa Co., Ltd., P. O. Box 22, Akim-Oda. RHOP: of world, esp. Papilionidae (esp. *Troides* [= *Ornithoptera*]), and *Charaxes* (African).

SOUTH AFRICA

Duke, Arthur, 17 St. Bede's Rd., Three Anchor Bay, Cape Town.
Wagner, Hans J., P. O. Box 2787, Johannesburg.

UGANDA

Sevastopulo, D. G., Box 401, Kampala, RHOP. MACRO. Life History, Genetics. Coll. Ex.

ASIA AND INDOAUSTRALIA

AUSTRALIA

Common, Ian F. B., Div. of Entomology, C.S.I.R., P. O. Box 109, City, Canberra, A.C.T. MACRO: Australian Phalaenidae. MICRO: Australian Tortricidae. Life History, Behavior, Migration. Coll.

Harman, Ian, c/o Mrs. Bisdee, Appletree Cottage, Dorset Rd., Croydon, Victoria. LEPID: esp. of Victoria. Coll. Ex. Sell.

Holmes, David R., "Holmden", Red Hill, Victoria. RHOP. MACRO. Coll. Ex.

Rockingham, N.W. (Lt.Comm.), H.M.A.S. "Australia", c/o G.P.O., Sydney, N.S.W. RHOP. MACRO. Migration. Coll. Ex.

Smith, Vick T. H., 20 Southway, Yallourn, Victoria. RHOP. Coll. Ex.

HONG KONG

Burkhardt, V. J. (Col.), c/o Mme. Natasha du Breuil, 6, Basilea, Lyttelton Rd.

INDIA

Himalayan Butterfly Co. (S. Sircar, Prop.), Shillong, Khasi Hills.

Shull, Ernest M., Ahwa, via Billimora, Dangs District, B.P.

INDONESIA

Straatman, Raymond, Gedong Biara est., p/o Kwala Simpang, Atjeh Timur, N. E. Sumatra. RHOP. and MACRO. Life History, foodplants, literature on Indonesian LEPID.

Wegner, A.M.R., Museum Zoologicum Bogoriense, Bogor.

JAPAN

Fujioka, Tomoo, Ho-13, 10 Nishikata-machi, Bunkyo-ku, Tokyo.

Hayano, Ikuo, 337 Shinohara-cho, Kohoku, Yokohama.

Inoue, Hiroshi, 290, Miyamae, Oka-machi, Minami-ku, Yokohama. MACRO: esp. Geometridae, Cymatophoridae, Drepanidae. Life History. Coll. Ex.

Ishiguro, Tadahisa, 1866 Horiuchi Hayama, Kanagawa-ken.

Iwase, Taro, 345 Komachi Kamakura, Kanagawa-ken. RHOP. Life History, Migration.

Jacoulet, Paul, Karuizawa, 1371, Nagano Ken, Shinshu.

Kuwayama, Satoru (Dr.), Hokkaido Agricultural Experiment Station, Kotoni, Sapporo. RHOP. MACRO: esp. Phalaenidae. Life History. Economic studies. Coll.

Kuzuya, Takeshi, Minami-Sonomachi 1-3, Nakaku, Nagoya.

Momoi, Shigeyuki, 282 Sannotani, Hommoku, Yokohama.

Ogata, Masami (Dr.), Ogata Hospital, No.18, 3-chome, Imabashi, Higashi-ku, Osaka. RHOP: esp. Hesperiidae. MACRO: Phalaenidae, Agaristidae, Arctiidae. Genitalic studies. Coll. Ex.

Okada, Yoshio, Yanagida-Cho, Saga, Kyoto. RHOP: esp. Papilionidae, Satyridae, Lycaenidae. Biogeography, Morphology. Coll. Ex.

Shirôzu, Takashi (Prof.), Entomological Lab., Dept. of Agriculture, Kyushu University, Fukuoka. RHOP. Life History, Food Plants, Distribution. Coll.

Takahashi, A., 70, 1-chome Shoeicho, Mizuho-ku Nagoya.

Tsuruta, Ts. (Dr.), c/o Mr. Takahashi, 467 Minami Oizumi Machi, Nerima Ku, Tokyo. LEPID. Life History. Coll. Ex.

Watari, Masami, 142 Kogai-cho, Azabu, Tokyo.

Yano, Fumihiko, 1178-2 2cho Uenoshiba-Mukogaokacho, Sakai City near Osaka.

NEW ZEALAND

Salmon, John D. (Dr.), Entomologist, Dominion Museum, Wellington.

PHILIPPINES

Lao, Johnny L.B., P.O. Box 2342, Manila.

Uichanco, Leopoldo B. (Dr.), Dean of College, Laguna. RHOP. Distribution. Coll.

EUROPE

AUSTRIA

Klimesch, Joseph, Linz a.d. Donau, Donatusgasse 4. LEPID: esp. *Nepticula, Coleophora,* and other leaf miners. Life History, Genetics. Coll. Ex. Sell.

Wilcke, Hermann (Dr.), Kössen/Tyrol Nr. 199. RHOP. MACRO: esp. Phalaenidae, Geometridae. Coll. Sell.

BELGIUM

Berger, Lucien, 2 Vallée des Artistes, Linkebeek-lez-Bruxelles. LEPID.

Dufrane, Abel, Musée d'Histoire Naturelle, Avenue du Tir, 69, Mons. LEPID. of world, esp. MICRO. Coll. Ex.

*Kiriakoff, S.G., Zoological Labs., Ghent University, 14 Universiteitsstraat, Ghent. RHOP: esp. Belgian Congo. MACRO: esp. Phalaenoidea, Thyretidae. MICRO: esp. Pyralidae. Phylogeny, Classification. Ex.

Overlaet, Frans G., 9 Chaussée de Louvain, Kortenberg (Brabant). LEPID. Life History, Mimicry. Coll. Ex. Buy. Sell.

CZECHOSLOVAKIA

Cejp, Karel (Prof.Dr.), Botanical Institut, Charles University, Benátská 2, Praha II. LEPID. Entomophytous fungi. Coll. Ex.

Losenicky, Zdeněk, Chválenická 38, Plzen I. RHOP. MACRO. Coll. Ex.

Moucha, Josef, Dusni 6, Praha 1.

Poláček, V.B., ul. Komenského, 601/I., Brandýs nad Labem. RHOP.

Povolný, Dalibor (Dr.), Instit. of Applied Entomology, Brno, Zemědělská 1. LEPID. of central Europe: esp. *Zygaena. Lithocolletis.* Coll. Ex.

Šmelhaus, Jiří, Bělského 4, Praha 7.

DENMARK

Andersen, Axel, Odensegade 7, Ø, Copenhagen. Biology, Distributional Factors. Coll. Ex. Sell.

*Christensen, Georg, Parmagade 24, III, Copenhagen S. RHOP: esp. *Argynnis, Phyciodes, Erebia.* Genetics. Coll. Ex.

FINLAND

Hackman, Walter (Dr.), Parkgatan 5, Helsingfors. RHOP. and MACRO. of Scandinavia. MICRO. of Holarctic region, esp. Coleophoridae, Gelechiidae (*Phthorimaea*). Systematics, Distribution. Coll.

Hellman, E.A. (Mr. and Mrs.), Annank. 2F, Helsinki. RHOP: esp. *Pieris, Argynnis, Brenthis.* MACRO: esp. *Acronycta.* MICRO. Coll. Ex. Sell.

Kaisila, Jouko, Zoological Institute of University, P. Rautatiek. 13, Helsinki.

Krogerus, Harry (Dr.), Mannerheimvägen 25A, Helsingfors. LEPID: esp. Tortricidae, and Canadian fauna. Coll. Ex.

Suomalainen, Esko (Prof.Dr.), Institute of Genetics, The University, P. Rautatiek. 13, Helsinki. LEPID. of Scandinavia. Genetics. Cytology.

FRANCE

Berjot, Etienne E., Villa "Pax", St. Martin de Crau, (Bouches du Rhone). RHOP. MACRO. Life History. Coll. Ex.

Bourgogne, Jean, Muséum d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5[e]. RHOP. MACRO: esp. Psychidae (Palaearctic and African). Life History, Morphology, Biology. Coll. Ex.

Fonquernie, Pierre, Directeur dépt. des P.T.T., Hôtel des Postes, Rennes (Ille-et-Vilaine).

Gaillard, François, 5 Cité du Midi, Paris 18[e]. RHOP. MACRO. Coll. Ex. Buy.

Herbulot, Claude, 31 Ave. d'Eylau, Paris 16[e]. MACRO: esp. Geometridae. Coll. Ex. Buy.

LeCharles, Louis, 22 Avenue des Gobelins, Paris V. RHOP. MACRO: esp. Zygaenidae. MICRO: Crambidae esp. *Crambus.* Biology. Coll. Ex.

LeMarchand, S., 125 rue de Rome, Paris 17[e].

deLesse, Hubert, Laboratoire d'Entomologie, 45 bis rue de Buffon, Paris 5[e]. RHOP: esp. Nymphalidae, Satyridae (*Erebia*). Coll. Ex.

Lichy, René (Prof.), 18 rue Voltaire, St. Leu-La Foret (S. et O.). RHOP: Venezuelan only, esp. *Eurema.* MACRO: esp. Sphingidae of the world. Zoogeography, Ecology. Coll. Ex. Buy.

Muspratt, Vera Molesworth (Mme.), Aïcé Choko St. Jean-de-Luz, Basses Pyrénées. RHOP. MACRO. Life History, Migration. Coll. Ex.

Rousseau-Decelle, Georges, 3 rue de Monceau, Paris 8.

*Stempffer, Henri, 4 rue Saint Antoine, Paris 4e. RHOP: esp. Lycaenidae (Holarctic and African). Coll. Ex.

Varin, Gilbert, 4 Ave. de Joinville, Joinville-le-Pont (Seine). RHOP: Nymphalidae, Satyridae. Subspeciation, Distribution. Coll. Ex.

Viette, Pierre E.L., Muséum Nat. d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5e. MICRO: esp. Homoneura (Micropterygidae, Eriocraniidae, Hepialidae). ♂ genitalia. Coll. Ex.

GERMANY

Amsel, H.G. (Dr.), (17b) Buchenberg bei Peterzell/Baden.

Börner, Carl (Dr.), Naumburg/Saale 19a, Jenaerstr.22, (Russian Zone). LEPID: esp. for Phylogenetics. Coll.

Busch, Theo (Herr), (22b) Niederadenau, über Adenau/Eifel. RHOP: esp. *Melitaea.* Life History. Coll. Ex.

Cretschmar, Max (Dr.), Casselstr. 21, (20) Celle Hann.

Forster, Walter (Dr.), Menzingerstrasse 67, München 38, (American Zone). RHOP: esp. Lycaenidae. MACRO. Zoogeography. Coll. Ex.

Hering, Erich M. (Prof.Dr.), Berlin N.4, Invalidenstr. 43, Zoologisches Museum. MACRO: Pericopidae, Zygaenidae, Dioptidae, etc. MICRO: leaf-miners of all orders. Coll. Ex.

Hesselbarth, Gerhard, (23) Diepholz (Hann.), Hindenburgstr. 13. Palaearctic RHOP. and MACRO: esp. Papilionidae, Pieridae, Bombyces, Arctiidae. Life History, Zoogeography. Coll. Ex.

Jäckh, Eberhard, Haydn Platz 11, Bremen. LEPID: esp. Micros. Life History. Coll. Ex.

Kampf, Ari W., Franz Jurgens Strasse 12, Düsseldorf 10. RHOP. and MACRO: African, esp. *Cymothoe* and *Charaxes.* Coll. Ex. Buy. Sell.

de Lattin, Gustaf J. (Dr.), Geilweilerhof, Post Siebeldingen (22a) über Landau/Pfalz, Forschungsinstitut f. Rebenzüchtung. RHOP: Holarctic, esp. Satyridae. MACRO: Holarctic, esp. Acronictinae and Bryophilinae. MICRO: esp. Palaerctic. Distribution, Evolution, Genetics. Coll. Ex.

Reichel, Johannes, Baumholder/Pfalz, Amerik. Personalbüro. RHOP: esp. Papilionidae. MACRO: esp. Sphingidae, Saturniidae, Arctiidae. MICRO. Life History, Hybridization. Coll. Ex. Buy. Sell.

Speyer, W. (Direktor Dr.), Heikendorf über Kiel 24B, Teichtor 22.

Warnecke, Georg (Landgerichtsdirektor), Hohenzollernring 32, Hamburg-Altona. Palaearctic RHOP. and MACRO: esp. Geometridae. Migration, Zoogeography. Coll.

HUNGARY

Gozmány, Lancelot A. (Dr.), Széll Kálmán tér. 13, Budapest XII. MICRO. Helophil Moths. Coll. Ex. Sell.

Kovács, L. (Dr.), Budapest XII. Kléh István u 3/a. III. 1.

Lengyel, Julius F. (Dr.), Budapest XII. Budakeszi ut 38. RHOP: of Europe, esp. *Melitaea.* MACRO: Phalaenidae, esp. *Cucullia.* Distribution, Zoogeography. Coll. Ex.

ITALY

Berio, (Dr.), Administrazione Doria, Piazza Principe 4, Genova.

Hartig, Fred (Pr. Count), Via Gregoriana 25, Rome.

Verity, Roger R. (Dr.), Caldine (Firenze). RHOP: esp. Palearctic. Coll. Ex. Buy.

MALTA

Valletta, Anthony, 257 Msida St. B, B'Kara. RHOP: esp. Satyridae and Nymphalidae. MACRO. MICRO. Coll. Ex.

NETHERLANDS

Diakonoff, A. (Dr.), Rijksmuseum van Natuurlijke Historie, Leiden. MICRO: all except Pyraloidea. Leaf-miners, Biology, Morphology. Coll. Ex. Buy.

Eisner, Curt, Violenweg 7, 's-Gravenhage (The Hague).
Lempke, B.J., Oude Yselstraat 12^{III}, Amsterdam Z-2. RHOP. and MACRO. of Netherlands. Life History.
Roepke, W. (Prof.Dr.), Lab. voor Entomologie, Berg 37, Wageningen. RHOP. and MACRO: esp. Palaearctic and Indomalayan. Life History, Ecology, Genetics, Morphology, Histology, Zoogeography, Systematics.

PORTUGAL

da Silva Cruz, Maria A., Quinta de S. João, Candal, Vila Nova de Gaia. RHOP: esp. *Melitaea.* MACRO: esp. Geometridae. Migration. Coll. Ex.

SPAIN

Agenjo, Ramon, Instituto Español de Entomología, Palacio del Hipódromo, Madrid. LEPID. of Spain. Coll.
Flores Casas, Hilario, Plaza de Lesseps 17, Barcelona. RHOP. MACRO. Coll. Ex. Buy. Sell.
Torres Sala, Juan, 1 Calle Dr. Romagosa, Valencia. Palearctic RHOP. World Papilionidae, Nymphalidae, Morphidae. Palearctic MACRO. World Saturniidae, Uraniidae, Castniidae. Life History. Coll. Ex. Buy.
Varea de Luque, Antonio, Calle de Ibiza 13, Madrid.

SWEDEN

Bryk, Felix, Riksmuseum, Stockholm 50. RHOP. Nervature, Morphology. MACRO.
Nordström, Frithiof (Dr.), Kungsholmstorg 1, Stockholm. MACRO: esp. Agrotidae, *Eupithecia.* Life History. Coll.

SWITZERLAND

Lüthi, Adrian J., Inneres Sommerhaus, Burgdorf. RHOP. MACRO: esp. Sphingidae. Coll. Ex. Buy. Sell.
Moulines, A., Grange-Canal, Genève.
Ruetimeyer, Ernest, 38 Rue Fédérale, Berne. RHOP. and MACRO: esp. Papilionidae, Pieridae, Danaidae, Satyridae, Phalaenidae. Coll. Ex.

UNITED KINGDOM

ENGLAND

Clarke, C.A. (Dr.), "High Close", Thorsway, Caldy, Cheshire.
*Ford, E.B. (Dr.), University Museum, Oxford. LEPID. Genetics. Coll.
Hards, Charles H., 40 Riverdale Road, Plumstead, London S.E. 18. English and American RHOP. and MACRO: esp. *Catocala,* Saturniidae. Life History, Migration, Distribution, Variation. Coll. Ex.
Heley, Robert G., "Lygoes", Burcott, Wing, Leighton Buzzard, Beds. RHOP: of world, esp. Pieridae, Nymphalidae, Papilionidae. MACRO: esp. Saturniidae. Distribution, Mimicry. Coll. Ex. Buy. Sell.
Hemming, Francis, 28 Park Village East, Regent's Park, London N.W. 1. RHOP: esp. Palaearctic and Nearctic. Coll. Ex. Buy.
Hinton, H.E. (Dr.), Dept. of Zoology, University of Bristol, Bristol. Phylogeny, Physiology. Coll. (larvae)
Lisney, A.A. (Dr.), 'Dune Gate', Clarence Road, Dorchester, Dorset. LEPID. Ecology. Coll.
Nevile, H. Ralph, The Rectory (Top Flat), Leire, near Rugby, Warwicks.
*Riley, Norman D., 7 McKay Road, London S.W. 20. RHOP.
Rivers, C.F., 'Heatherbank', 250 Shepherds Lane, Dartford, Kent.
Smith, P. Siviter, 21 Melville Hall, Holly Road, Edgbaston, Birmingham 16. RHOP: esp. *Lycaena.* Coll. Ex. Buy.
Tams, W.H.T., Dept. of Entomology, British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7. MACRO: esp. Lasiocampidae, Agrotidae. MICRO: esp. Pyralidae, Tinaeidae. Life History.
Warren, Brisbane C.S., 3 Augusta Mansions, Folkestone, Kent. RHOP: esp. Satyridae, Nymphalidae. Life History, Distribution. Coll.
Williams, C.B. (Dr.), Rothamsted Experimental Station, Harpenden, Herts. Migration, Populations, Ecology. Coll. Ex.

YUGOSLAVIA

Lorković, Z. (Prof. Dr.), Medical Faculty, Zagrebian University, Zagreb.

LATIN AMERICA

ARGENTINA

Bourquin, Fernando F., Calle Conde 1639, Buenos Aires. LEPID: Life History only. Coll.

Breyer, Alberto, Maipu 267, Buenos Aires. RHOP. and MACRO: Argentine only. Coll.

Hayward, Kenneth J. (Prof.), Miguel Lillo 205, Tucumán. RHOP: Neotropical, esp. Argentine, and Hesperiidae.

Orfila, Ricardo N. (Dr.), Casilla Correo 2.-Suc.28, Buenos Aires. Neotropical LEPID: esp. Phalaenoidea and Tortricoidea. Coll. Ex.

Pastrana, José A., Solis 370, Buenos Aires. MICRO: esp. Pyralidoidea, Tortricoidea. Coll. Ex.

Yiboff, León, Amoretti 184, Ciudadela, Buenos Aires.

BRAZIL

d'Almeida, Remualdo F. (Dr.), Rua Viana Junier, 25, Encantado, Rio de Janeiro, D.F. RHOP: esp. Ithomiinae, Pieridae, Papilionidae. MACRO: esp. Syntomidae, Arctiidae, Sphingidae, Saturnioidea. Biology. Coll. Ex. Buy.

*Araujo, R. L. (Dr.), Instituto Biologico, Caixa Postal 7119, São Paulo, S.P. MACRO: esp. Castniidae, Dalceridae. Coll. Buy.

Cardoso, Aldo (Dr.), Avenida Teresa Cristina 65, Maceió, Alagoas. LEPID. of the world, esp. Saturnioidea. Ex.

Ebert, Heinz (Dr.), Avenida Pasteur 404, Commissão National da Produção Mineral, Rio de Janeiro. RHOP. of world: esp. Lycaenidae. Lepidoptera Photography.

Iserhard F^{o}, Carlos D., Caixa Postal 266, Porto Alegre, Rio Grande do Sul.

Kesselring, Jorge, Caixa Postal 6, João, Pessoa, (Paraíba). RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

Oiticica F^{o}., José (Dr.), Rua Alfredo Chaves 59, Rio de Janeiro. RHOP. MACRO: esp. Sphingidae, Saturniidae. Morphology. Coll. Ex. Buy.

PEARSON, HENRY R., Caixa Postal 5151, Rio de Janeiro. RHOP: esp. Nearctic Papilionidae. MACRO: esp. Saturniidae, Sphingidae, Mimallonidae. Life History, Food Plants, etc. Coll. Ex. Buy.

Travassos, Lauro (Prof.), Instituto Oswaldo Cruz, Laboratorio de Helmintologia, Caixa Postal 926, Rio de Janeiro, D.F. MACRO: esp. Arctiidae, Adelocephalidae. Coll. Ex.

Travassos F^{o}., Lauro (Dr.), Dept. de Zoologia, Secr. da Agricultura, Caixa Postal 7172, São Paulo. MACRO: esp. Ctenuchidae, Pericopidae, Castniidae. Life History. Coll. Ex.

BRITISH WEST INDIES

Bellinger, Peter F. (Dr.), University College of the West Indies, Mona, St. Andrew, Jamaica. LEPID. Coloration, Genetics. Coll. Ex.

Lewis, C. Bernard, Science Museum, Institute of Jamaica, Kingston, Jamaica. RHOP: esp. of Jamaica and Cayman Islands. Coll.

Perkins, Lilly G., Sunnybank, Claremont, St. Ann, Jamaica. RHOP. MACRO: esp. Sphingidae. Sell.

CHILE

Herrera González, José (Prof.), Lo Ovalle 0195, Santiago. RHOP: esp. Pieridae, Nymphalidae, Satyridae. Genitalia, Genetics. Coll. Ex.

CUBA

de la Torre y Callejas, S.L. (Dr.), Playa 75½, Matanzas. RHOP: esp. *Eurema.* Coll. Ex.

MEXICO

Butler, Robert, Apartado Postal 11, Ocotlan, Jalisco. RHOP: of the world; esp. Papilionidae, Nymphalidae, and Pieridae. MACRO: Saturniidae.

Escalante, Tarsicio (Dr.), Av. Cuitlahuac 63, Mexico 17, D.F.

NORTH AMERICA

CANADA

ALBERTA

BOWMAN, KENNETH, 10240 Wadhurst Rd., Edmonton.
Wyatt, Colin W., c/o General Delivery, Banff. RHOP: Palearctic and Nearctic, esp. Alpine and Arctic spp. Local Races. Coll. Ex. Buy. Sell.

BRITISH COLUMBIA

*Fitch, Richard J., 2235 Pandora St., Vancouver. Arctic LEPID. Sell.
*Guppy, Richard, R.R. 1, Marine Drive, Wellington. MACRO. Coll. Ex. Sell.

MANITOBA

Bird, Charles, 1930 Rosser Ave., Brandon. RHOP: esp. Hesperiidae, Pieridae. Coll.
*Quelch, C.S., Transcona. LEPID: esp. Central and S. American. RHOP. Coll. Ex.

NOVA SCOTIA

*Ferguson, Douglas C., Nova Scotia Museum of Science, Halifax. RHOP: Nearctic. MACRO: Nearctic, esp. Geometridae. Life History, Distribution. Coll. Ex.

ONTARIO

Bailey, Earl G., Tecumseh St., General Delivery, St. Catherines. RHOP. MACRO. Coll. Ex. Sell.
Beirne, Bryan P. (Dr.), Division of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. MACRO. MICRO. Ecology, Distribution. Coll. Ex.
*BRUGGEMANN, PAUL F., 176 Crerar Ave., Ottawa. RHOP. MACRO: esp. Geometridae. MICRO: esp. Hepialidae. Life History. Coll. Ex. Buy. Sell.
*Freeman, Thomas N. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP: esp. of Arctic. MACRO. MICRO. Coll. Ex.
*Hardwick, David F., Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. MACRO: esp. Phalaenidae. Coll. Ex.
Harrington, Peter T., 88 Heddington Ave., Toronto. RHOP: Papilionoidea of N. Amer.; Papilionidae, Danaidae, and Heliconiidae of world. Coll. Ex. Buy.
Lambert, Robert, Dept. of Agriculture, Systematic Entomology, Science Service, Ottawa. MICRO: esp. Tortricidae. Forest Lepidoptera, Biology. Coll.
McKay, Margaret (Miss), Div. Entomology, Science Service Bldg., Ottawa. LEPID. larvae.
*Munroe, E.G. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP. MACRO. MICRO: esp. Pyralidae and related families. Coll. Ex. Buy.
ROGERSON, JOHN L., 30 First Ave., Coniston. RHOP. Coll. Ex.
Wigmore, R.H., Room 111, Science Service Bldg., Carling Ave., Ottawa. MACRO: esp. Phalaenidae. Coll. Ex.

QUEBEC

*Adelphe, (Rev. Brother), École Supérieure Richard, 200 Rue Galt, Verdun. RHOP: esp. of eastern Canada. MACRO: esp. Phalaenidae of east. Canada. Coll.
*Gray, P.H.H. (Dr.), Box 236, Macdonald College. RHOP. MACRO. Biology. Coll.
*Sheppard, Arthur C., 5554 Coolbrook Ave., Montreal 29. LEPID: of Quebec only. Coll. Ex. Buy. Sell.

SASKATCHEWAN

SHAW, J.P., Box 1056, Weyburn.

UNITED STATES OF AMERICA

ALABAMA

*Chermock, Ralph L. (Dr.), Box 2047, University of Alabama, University. RHOP: esp. Satyridae. Phylogeny. Coll. Ex. Buy.
Epstein, Hans J., 3 Hazel Hedge Lane, Montgomery 6. RHOP: esp. Papilionidae. MACRO: esp. Sphingidae. Coll. Ex. Buy. Sell.

CALIFORNIA

Baber, Donald L., 1511 Drake Ave., Burlingame. RHOP: esp. Papilionidae and Nymphalidae. Life History. Coll. Ex. Buy. Sell.

Baker, Nelson W., 279 Sherwood Drive, Santa Barbara.

*BAUER, WILLIAM R., 235 Liberty St., Petaluma. MACRO. Life History, Collecting Methods. Coll. Ex. Buy.

*Bio Metal Associates, P.O. Box 346, Beverly Hills.

Blackman, Thomas M., P.O. Box 125, Perris.

Burdick, W.N., 1108 S. Harvard Blvd., Los Angeles 6. RHOP. of Rocky Mts. and West only. Coll. Ex.

*Comstock, John A. (Dr.), P.O. Box 158, Del Mar. LEPID. Life History. Coll.

Coy, L. P. (Dr.), 30 South El Camino Real, San Mateo. RHOP: esp. *Speyeria, Euchloe.* Coll. Ex.

*Creelman, James L., 2214 Logan Ave., San Diego 13. RHOP: Nearctic and South Pacific. Coll. Ex. Sell.

*CRICKMER, NOEL, Borrego Valley, Borrego Springs. LEPID. Coll. Ex.

Damin, Verna A. (Mrs.), 318 Poplar Ave., Modesto.

*Davies, Thomas W., 791 Elsie Ave., San Leandro. RHOP. MACRO. Coll. Ex. Buy. Sell.

Essig, E.O. (Prof.), 112 Agriculture Hall, University of California, Berkeley 4. LEPID: esp. of western North America. Coll.

*Evans, William H., 8711 La Tuna Canyon Road, Sun Valley. LEPID: esp. *Annaphila,* Heliothiinae, Geometridae. Life History, Photography. Coll. Sell.

*Ford, Robert J., 3266 Ardmore Ave., South Gate. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

*Friday, F.W., Box 72, Palm Desert. RHOP. Coll. Ex. Buy. Sell.

*Guedet, Edward F. (Rev.), 1818 Eddy St., San Francisco 15. MACRO: esp. Geometridae. Coll. Ex. Buy.

HALBERT, RICHARD L., 6332 E. Carmelita Ave., Bell. MACRO: esp. Saturniidae. Life History, Hybridization. Coll. Ex. Buy. Sell.

*Hammer, William A., 1923 Evergreen Ave., San Leandro. RHOP: esp. *Speyeria, Colias, Oeneis.* MACRO: Coll. Ex. Buy.

Harlick, Robert M., 2159 33rd Ave., San Francisco 22.

Hartman, Willard D. (Dr.), Dept. of Zoology, University of California, Berkeley 4. RHOP.

Hill, Charles, 1350 San Luis Rey Drive, Glendale 8. MACRO: esp. Phalaenidae of western Nearctic region. Coll. Ex. Buy.

*Hovanitz, William (Dr.) Dept. of Biology, University of San Francisco, San Francisco 17. RHOP. Genetics.

*Hulbirt, Lowell H., 622 N. Bright Ave., Whittier. RHOP: esp. Lycaenidae, Hesperiidae. Coll. Ex.

Karp, Ben, 3148 Foothill Blvd., La Crescenta. MICRO. Coll. Ex. Buy. Sell.

*KIRKWOOD, CARL W., Box 47, Summerland. LEPID. Coll. Ex. Buy.

Laspe, Charles G., 1326 Granada, Long Beach 4. RHOP: esp. Papilionidae. Coll.

Linsdale, Donald D., Hastings Reservation, Jamesburg Route, Robles del Rio. RHOP. MACRO. Coll.

Macheboeuf, Charles, Kelseyville. Coll. Ex. Buy. Sell.

*McHENRY, PADDY, 1032 E. Santa Anita, Burbank. Original Descriptions of Nearctic Rhop. Coll.

MacNeill, C. Don, Dept. of Entomology, 112 Agriculture Hall, University of California, Berkeley 4.

*MARTIN, LLOYD M., Los Angeles County Museum, Exposition Park, Los Angeles 7. RHOP: esp. *Speyeria, Euphydryas,* Hesperiidae. Life History. Coll. Ex.

*Mattoni, Rudolf H.T., Div. of Zoology, University of California, Los Angeles 24. RHOP: esp. *Philotes, Glaucopsyche.* Genonomy, Physiology. Coll. Ex. Buy. Sell.

*Meyer, William T., 4450 Kingswell Ave., Hollywood 27. LEPID. Coll. Ex. Buy. Sell.

Minahan, Roger P., 8372 E. Westminster Ave., Westminster. LEPID: esp. moths. Ecology, Genetics, Life History, Parasitology.

Opler, Paul A., 415 Beatrice Road, Concord. RHOP: esp. *Speyeria, Papilio.* MACRO. Life History of *Papilio.* Coll. Ex.

Pease,RogerW.,Jr. (Sgt.), Hq. 1st Cavalry Div. (AG Section), APO 201, c/o Postmaster, San Francisco. RHOP. MACRO. Coll. Ex.

Reichart, George B., 5580 Estates Drive, Oakland 18.

*Reid, Robert H., 4442 Franklin Ave., Los Angeles 27. RHOP. MACRO. Coll. Ex.
*Roberds, Joseph 2022 Huntington Lane, Redondo Beach. RHOP: esp. *Papilio, Speyeria, Colias.* Coll. Ex.
Rubbert, Allen, 1915 Terrace Way, Bakersfield.
Sala, Frank P., 1912 Hilton Drive, Burbank. RHOP. MACRO: esp. Saturniidae, *Catocala,* Phalaenidae. MICRO: esp. Aegeriidae, Cossidae. Life History. Coll. Ex. Sell.
Samuelson, G. Allan, 3824 Walnut Ave., Concord.
Schmela, Dora E. (Mrs.), 2883 Grove St., Ventura. RHOP. Coll.
Smith, Arthur C., P.O. Box 411, Berkeley. RHOP. and MACRO. of Mexico and Southwestern U.S.A. Ecology, Distribution. Coll. Ex. Buy. Sell.
Smoker, Samuel R., 105 Topeka Ave., San Jose, Calif.
*SPERRY, JOHN L., 3260 Redwood Drive, Riverside. RHOP. of world. MACRO: esp. Geometridae of world. Coll. Ex. Buy.
*THORNE, FRED T., 1298 Merritt Drive, Rt. 1, El Cajon. RHOP: esp. Theclinae. Life History. Coll. Ex.
TILDEN, J.W. (Dr.), 125 Cedar Lane, San Jose. RHOP: esp. Hesperiidae. MICRO. Food Relationships, Behavior. Coll. Ex.
*Weber, Bernie H., 359 E. Angeleno Ave., Burbank. RHOP. Coll. Ex.
Wittman, R.N., Box A, Borrego Springs. Coll.

COLORADO

*Brown, F. Martin, Fountain Valley School, Colorado Springs. RHOP: esp. Pieridae and Satyridae of neotropics. Distribution. Coll. Ex. Buy.
*Eff, J. Donald, 820 Grant St., Boulder. RHOP: esp. *Melitaea, Euphydryas,* and Arctic species. Coll. Ex. Sell.
MAY, J.F., Lytle Star Route, Colorado Springs. Large insects of the world, esp. Orthoptera. Coll. Ex. Buy.
Minor, W.C., P.O. Box 62, Fruita. RHOP: esp. Rocky Mt. fauna. MACRO. Coll. Ex. Buy. Sell.
*Renk, John J. (Brother), Regis College, W. 50th and Lowell Blvd., Denver 11. RHOP: esp. *Catagramma.* Coloration. Coll. Ex. Buy.
Rotger, Bernard (Rev.), Pagosa Springs. RHOP: esp. of Colorado. MACRO. Coll. Ex. Buy. Sell.
Schryver, C.D., 4561 Wolff St., Denver 12. RHOP. Coll. Ex.

CONNECTICUT

Bakeless, John (Dr.), Great Hill, R.D. 2, Seymour. RHOP: Nymphalidae. Migration. Coll. Ex.
Beall, Geoffrey (Dr.), Dept. of Mathematics, University of Connecticut, Storrs. Migration.
Carleton, Bukk G., 3rd, Parade Hill Lane, New Canaan.
*HESSEL, SIDNEY A., Nettleton Hollow Road, Washington. RHOP. MACRO: esp. *Catocala.* Coll.
*Remington, Charles L. (Prof.), Osborn Zoological Lab., Yale University, New Haven 11. LEPID: Genetics and Life History. Coll. Ex. Buy.
*Remington, Jeanne E. (Mrs.), Osborn Zoological Lab., Yale University, New Haven 11.
*Schroeter, Otto H. (Col.), P.O. Box 391, Quaker Hill. RHOP. MACRO. Coll. Ex. Buy. Sell.
*Wilhelm, Herman P., Buckingham Rd., Willimantic. RHOP. MACRO. Coll. Ex. Buy. Sell.

DELAWARE

Jones, Frank Morton (Dr.), 2000 Riverview Ave., Wilmington. LEPID: esp. Psychidae. Coll. Ex. Buy.

DISTRICT OF COLUMBIA

*CLARK, AUSTIN H., Smithsonian Institution, Washington 25. RHOP.
*Field, William D., Division of Insects, U.S. National Museum, Washington 25. RHOP: esp. Lycaenidae.

FLORIDA

Davidson, W.M., 1504 Bodell St., Orlando. RHOP. MACRO. Coll.
*Fuller, Stanley V., Cassadaga P.O., Volusia County. RHOP. MACRO: esp. Sphingidae and Catocalinae. Life History. Coll.

*Grimshawe, Florence M. (Mrs.), 766 N.W. 13th Ave., Miami 35. RHOP. and MACRO. of S. Florida and Keys, esp. *Papilio ponceana.* Coll. Sell.
KILMAN, LEROY N., 2314 59th St. South, St. Petersburg 7.
*KIMBALL, CHARLES P., Route 4, Box 942, Sarasota. LEPID. Chemical Baits. Coll. Ex. Buy.
*KING, H.L., Box 1171, Sarasota. RHOP. Coll. Ex.
Myers, Joseph A., 816 N. Olive Ave., West Palm Beach. LEPID. Coll.

GEORGIA

*Fattig, P.W., Box 788, Emory University. LEPID. Coll.
*Harris, Lucien, Jr., P.O. Box 167, Avondale Estates. RHOP. MACRO: esp. *Catocala, Sphinx.* Coll. Ex.
Harris, Lucien, III, 2284 Pembroke Place, Atlanta.
Knudsen, John P., Oglethorpe University, Oglethorpe University.
Sams, Robert, Jr., 172 Huntington Rd., N.W., Atlanta.
*Smith, M. Eugene, Rt. #2, Newnan. RHOP. MACRO. Life History.
*TOWERS, ABNER A., 2421 Sagamore Drive N.W., Atlanta. RHOP. and MACRO: Nearctic only. Coll. Ex.

HAWAII

*Calkins, Virgil F., P.O. Box 461, U.S. Immigration-Naturalization Service, Honolulu 9, Oahu. RHOP: Nearctic. MACRO: esp. Saturniidae, Sphingidae, Ceratocampidae, *Catocala.* Coll. Buy. Sell.
SETTE, OSCAR E., 4490 Aukai Ave., Honolulu, Hawaii, T.H.

IDAHO

MANNING, JAMES H., 1515 N. 26th, Boise. RHOP: Nearctic. MACRO: esp. *Catocala,* Sphingidae. Coll. Ex.

ILLINOIS

Allyn, Arthur C., Jr., 100 West Monroe St., Chicago.
Banks, Leslie, 900 Gunnison St., Chicago 40. RHOP. MACRO: esp. Geometridae, Heliothiinae, Notodontidae. Coll. Ex. Buy.
*BRISTOL, MAURICE L., 511 May St., Elgin. RHOP. MACRO: esp. *Apantesis, Catocala,* Phalaenidae. Coll. Ex. Buy.
Conway, Patrick J., R.R. #3, Box 127, Aledo.
Dalkoff, Leonard, 1726 29½ St., Rock Island.
Dluhy, Eugene, 3912 N. Hamilton Ave., Chicago 18. LEPID. Coll. Ex. Buy. Sell.
FAGER, EDWARD W. (Dr.), Institute of Radiobiology and Biophysics, University of Chicago, Chicago 37. RHOP: esp. Theclinae. Coll. Ex. Buy.
French, Ellery W., Dept. of Entomology, University of Illinois, Champaign. RHOP. MACRO.
Fryxell, Thomas, 1331 42nd Ave., Rock Island.
Fulton, MacDonald (Dr.), Dept. of Bacteriology, Loyola School of Medicine, 706 S. Wolcott Ave., Chicago 12. RHOP. Coll.
*Gerhard, W.J., Curator of Insects, Chicago Natural History Museum, Chicago 5. RHOP. MACRO.
*Glenn, Murray O., 1019 Normal St., Henry. MACRO: esp. Gelechioidea. MICRO. Life History. Coll. Ex. Buy.
Hayes, Joseph B., 7522 Forest Preserve Drive, Chicago 34. RHOP: esp. Papilionidae. MACRO: esp. *Catocala.* Life History. Coll. Ex. Buy. Sell.
Hessler, Robert, 6510 N. Campbell, Chicago 45. RHOP. MACRO. Coll. Ex. Buy.
*HOLLEY, F.E., 126 E. Ash St., Lombard. RHOP. MACRO: esp. Sphingidae, Saturniidae, Ceratocampidae. Life History. Coll. Ex. Buy.
*IRWIN, RODERICK R., 411 N. Bloomington St., Streator. RHOP. Coll. Ex. Buy.
Jelinek, Anton, 3900 Diversey Ave., Chicago 47. RHOP: of tropics, esp. *Morpho, Papilio.* Coll. Ex. Buy. Sell.
KISTNER, DAVID H., 5031 N. Kolmar Ave., Chicago 30. RHOP: esp. *Speyeria.* MACRO: esp. Phalaenidae. Distribution. Coll. Ex.
*Lauck, Albert G., 2716 Grandview Ave., Alton. RHOP: esp. *Oeneis, Erebia, Boloria,* Lycaenidae. Coll. Ex.

LEUSCHNER, RONALD, 1172 S. Wenonah Ave., Oak Park. RHOP: esp. *Speyeria, Boloria, Melitaea.* MACRO. Coll. Ex.
*McElhose, Arthur L., 816 N. Belmont Ave., Arlington Heights. RHOP. MICRO. Coll. Ex.
MERRIAM, ELSEY E. (Miss), 4520 Clarendon Ave., Chicago 40.
Mills, Kenneth R., 3322 Jackson St., Alton.
*Panske, Leonard G., 2215 W. Eire St., Chicago. RHOP. MACRO. Life History. Coll. Buy.
Phillips, Leonard S., 1928 South Trumbull Avenue, Chicago 23. RHOP. MACRO: esp. *Catocala.* Coll. Ex. Buy. Sell.
Rutkowski, Frank E., 5723 McVicker Ave., Chicago 30. MACRO. Life History. Coll.
Sasko, V.G. (Prof.), 1937 W. Chicago Ave., Chicago 22. RHOP: esp. Papilionidae, Nymphalidae, *Morpho* of western hemisphere. MACRO: esp. *Sphinx,* Saturniidae, Lasiocampidae and smaller moths, *Catocala.* Life History. Ex. Buy. Sell.
*Schoenherr, William H., 225 Cedar Ave., Danville. RHOP: esp. Pieridae, *Papilio.* MACRO: esp. Sphingidae. Distribution, Life History. Coll. Ex. Buy. Sell.
SICHER, HARRY (Dr.), Loyola University School of Dentistry, 1757 W. Harrison St., Chicago 12.
*WOODCOCK, HAROLD E., 6115 Newport Ave., Chicago 34. LEPID. Coll. Ex. Buy.
*Wyatt, Alex K., 5842 N. Kirby Ave., Chicago 30. RHOP. MACRO: esp. *Eubaphe,* Heliothiinae. Life History. Coll. Ex.

INDIANA

Badger, F. S., 423 Forest Drive, Kokomo. RHOP. MACRO. Coll.
Shields, James, 503 West Sixth St., Marion. RHOP: esp. Papilionoidea. Coll. Ex. Buy.
Wren, George R., 700 Pierce St., Gary. RHOP: esp. Satyridae. Mimicry. Coll.
*Young, Frank N. (Dr.), Dept. of Zoology, Indiana University, Bloomington. Extinction of Rhop. by human agencies.

IOWA

Booth, Oliver E., 907 Clinton Ave., Des Moines 13.

KANSAS

Bancroft, Larry, 1023 S. Main, Ottawa. LEPID. Coll. Ex. Buy.
Hoffman, James, 1039 S. Mulberry, Ottawa. RHOP: esp. Papilionidae, Pieridae, Nymphalidae. MACRO: esp. Sphingidae, Saturniidae. Coll. Ex. Buy. Sell.
Howe, William, 822 E. Eleventh St., Ottawa. RHOP: esp. *Papilio, Troides, Morpho.* MACRO: esp. Sphingidae, Saturniidae. Coll. Ex. Buy.
*STALLINGS, DON B., Caldwell. RHOP: esp.*Strymon, Euphydryas, Hesperia, Megathymus.* Racial Distribution, Seasonal Forms. Coll. Ex. Buy.

KENTUCKY

*Bishop, John A. (Dr.), Jeffersontown. RHOP. MACRO. Coll. Ex. Buy. Sell.
*Cook, Carl, Crailhope. RHOP: esp. Papilionidae of the world. Coll. Ex. Buy. Sell.
MERRITT, JAMES R. (Prof)., School of Law, University of Louisville, Louisville 8. RHOP. Coll. Ex. Buy.
Monroe, Burt L., Jr., Ridge Road, Anchorage. RHOP. MACRO. Coll. Ex.

LOUISIANA

Berg, George H., Room 319, Custom House, New Orleans 16. RHOP: esp. Papilionidae of world. Coll. Ex. Buy.

MAINE

*BROWER, A.E. (Dr.), 5 Hospital St., Augusta. RHOP: esp. of eastern U.S.A. MACRO: esp. *Catocala.* MICRO: esp. Aegeriidae. Life History. Coll. Ex. Buy. Sell.
*GREY, L. PAUL, R.F.D., Lincoln. RHOP: Argynninae only. Coll. Ex. Buy. Sell.

MARYLAND

Cross, Frank C., 9413 Second Ave., Silver Spring. RHOP.
Fales, John H., 1917 Elkhart St., Silver Spring. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.
Ghika, George, 3900 Hamilton St., F 101, Hyattsville. Melanism.

MacLeod, Ellis G., 8810 Manchester Rd., #2, Silver Spring. RHOP: *Colias* of eastern U.S.A.: Taxonomy, Distribution, Biology; Interspecific Hybridization.

*Robinson, Paul F., 425 Barnes St., Bel Air. RHOP. Life History, Physiology. Coll. Buy.

SIMMONS, ROBERT S. (Dr.), 1305 Light St., Baltimore 30.

Stein, George L., 615 Washington St., Cumberland. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.

MASSACHUSETTS

*Alexander, Charles P. (Prof.), Fernald Hall, University of Massachusetts, Amherst. Classification, Distribution.

*Bailey, Norman S. (Prof.), 61 Pillion Rd., Milton 86. Life History, Ecology.

Belcher, Harry C., Jr., 133 Hawthorne St., East Weymouth.

*Carpenter, A.J., 236 Huntington Ave., Boston. RHOP. Coll. Buy.

*Carpenter, Frank M. (Prof.), Biological Labs., Harvard University, Cambridge 38. Fossil insects.

*Coher, Edward I., 47 Mt. Pleasant, Amherst. Coll. Sell.

Cottrell, G.W. (Mrs.), 70 Lake View Ave., Cambridge 38.

Edwards, Robert L. (Dr.), Biological Laboratories, Brandeis University, Waltham.

Hilliard, Stephen S., 25 Beech St., Framingham.

*Johnston, William M., 383 South St., Jamaica Plain. RHOP: of New England. Coll.

Kamp, George W., 44 Holmes Rd., Dedham. Coll. Ex. Buy.

*Learned, Elmer T. (Dr.), 542 Maple St., Fall River. RHOP. MACRO. Genetics.

McCabe, David T., 15 Fiske Rd., Wellesley Hills 82. RHOP: esp. *Colias.* MACRO: esp. *Catocala.* Coll.

*ROGERS, W. PRESCOTT, 353 Lincoln Ave., Fall River. RHOP. Coll. Ex. Buy.

Scott, Arthur H., 20 Bishop Pky., Pittsfield. Life History. Coll. Ex. Buy.

Shappirio, David G., Biological Laboratories, Harvard University, Cambridge 38. LEPID. Chemistry of Insect Pigments. Coll.

*Smith, Marion E. (Dr.), Fernald Hall, University of Massachusetts, Amherst. MACRO: esp. Arctiidae. Life History. Univ. Coll.

WALCOTT, CHARLES, 81 Sparks St., Cambridge 38. MACRO: Saturniidae. Life History, Photography, Sex Attractants in Moths. Coll. Ex. Buy. Sell.

Williams, Carroll M. (Prof.), Biological Labs., Harvard University, Cambridge 38. RHOP. MACRO: esp. Saturniidae. Physiology of metamorphosis. Coll. Buy.

MICHIGAN

*Beebe, Ralph, 4169 Tenth St., Ecorse 29. MICRO. Distribution and Food Plants in Michigan. Coll.

Crampton, Charlene E. (Miss), Rt.#1, White Pigeon.

*Dreisbach, Robert R., 301 Helen St., Midland. LEPID. of Michigan. Coll. Ex.

Hodges, Ronald, 1123 Theodore St., Lansing 15.

*Hynes, Vonta P. (Mrs.), 152 Meachem Ave., Battle Creek. LEPID. Life History. Coll. Ex. Buy. Sell.

Lems, Kees, 1319 Hill St., Ann Arbor. RHOP. MACRO. Migration. Coll. Ex.

Lewis, Elwyn, 427 E. Rankin St., Flint 5.

*McALPINE, WILBUR S., 636 S. Woodward Ave., Birmingham. RHOP: esp. Riodinidae. MACRO: local. Life History. Coll. Ex. Buy. Sell.

*Newman, John H., 9821 Peer Road, R.F.D. #1, South Lyon. LEPID: of Michigan. Coll. Ex.

*Nielsen, M.C., 1816 Coleman Ave., Lansing 10. RHOP. MACRO: esp. Sphingidae, Saturniidae, Phalaenidae. Coll. Ex.

Perkins, Owen A., 1605 Crooks Road, Royal Oak. LEPID: esp. of Michigan. Classification, Distribution. Coll. Ex. Buy.

Richard, Roger E., 1811 N. Highview, Dearborn. RHOP: esp. *Asterocampa, Libythea.* Photography of Life History. Coll.

*Vogel, Harold A., 12040 Duchess, Detroit 24. RHOP. MACRO. Coll. Ex.

*VOSS, EDWARD G., Dept. of Botany, University of Michigan, Ann Arbor. LEPID. of Michigan. Hesperiidae of world, esp. classification and phylogeny. Coll. Ex.

Wilson, Bruce V., 815 N. Chipman St., Owosso.

MINNESOTA

Cox, Sam M., 127 N. 10th Ave., East, Duluth 5.

MISSISSIPPI

Jones, Jack R., Jr., 304 Robinhood Road, Jackson. MACRO: Sphingidae, Saturniidae, Citheroniidae, *Catocala.*
*MATHER, BRYANT, P.O. Drawer 2131, Jackson. RHOP. Coll.

MISSOURI

Heitzman, John R., 2438 Sterling Ave., Independence.
*MEINERS, EDWIN P. (Dr.), 6651 Enright Ave., St. Louis 5. RHOP. MACRO: esp. Arctiidae. Coll. Ex. Buy.
*Pickel, Benjamin H., 3619 Gordon Ave., Overland 21. RHOP: esp. Theclinae. Migration. Ex. Buy. Sell.
*REMINGTON, P. SHELDON, 5570 Etzel Ave., St. Louis 12. RHOP: Hesperiidae, esp. *Megathymus, Hesperia,* Lycaenidae, *Oeneis, Erebia.* MACRO: esp. Sphingidae, Saturniidae, *Catocala.* Coll. Ex. Buy.
*Thomas, George W., 106 Whitten Hall, Dept. of Entomology, University of Missouri, Columbia. MACRO: esp. Phalaenidae (Plusiinae). Parasites. Coll. Ex. Buy. Sell.

NEBRASKA

FROEMEL, E.A., Columbus. RHOP. MACRO: esp. *Catocala.* Coll. Ex. Buy.
Johnston, David W., Box 377, Broken Bow.

NEW HAMPSHIRE

*Gerould, John H. (Prof.), 36 Occom Ridge, Hanover. RHOP: Pieridae, esp. *Colias.* MACRO: esp. *Bombyx.* Genetics, ecology of *Colias;* Anatomy and circulation of *Bombyx.* Mimicry. Coll.
*LENNOX, DONALD J., R.F.D. #1, Whitefield. RHOP. MACRO. Life History. Coll. Ex.

NEW JERSEY

BOONE, PETER, R.F.D. 3, Box 172, Princeton. MACRO: esp. Sphingidae, Ceratocampidae.
BROWER, LINCOLN P., P.O. Box 111, Madison.
*BUCHHOLZ, OTTO, 493 Markthaler Place, Roselle Park. RHOP. MACRO. Coll. Ex. Buy.
Cadbury, John W., III, Spung Hollow, R.D. #1, Pemberton. MACRO: esp. Phalaenidae, Notodontidae, Sphingidae. Coll. Ex. Buy. Sell.
Comstock, W.P., 117 Lincoln Ave., Newark 4.
*DOS PASSOS, CYRIL F., Washington Corners, Mendham. RHOP: Satyridae, esp. *Oeneis, Erebia.* Coll. Buy.
*Ehrlich, Paul R., 538 Academy St., Maplewood. RHOP: Nearctic, esp. *Erebia* and *Oeneis.* MACRO. MICRO. Alpine forms, Distribution. Coll. Ex. Buy. Sell.
Fleming, Henry, Box 338, Coytesville.
Garthe, William, Hanover Road, Hanover. RHOP. MACRO. Life History. Coll. Ex. Buy.
MACGREGOR, C. RUSSELL (Mr. and Mrs.), Corey Lane, Mendham. Coll. Ex.
Mueller, Joseph, 16 Exeter Road, Short Hills. LEPID: of New Jersey only. Life History. Coll.
Naumann, Fred T., 17 Beekman Terrace, Summit. Life History.
OSBORNE, MELVILLE W., 2100 Price St., Rahway. RHOP: esp. Morphidae. MACRO: esp. Saturniidae. Inflation of larvae. Coll. Ex. Sell.
*Rawson, George W. (Dr.), c/o Ciba Pharmaceutical Products, Inc., Summit. RHOP. MACRO. Ecology, Distribution, Biochemistry. Coll. Ex.
Sheldrick, Peter, Mt. Kemble Ave., Morristown.
Small, Gordon B., Jr., 100 Oxford St., Glen Ridge. RHOP: esp. Lycaenidae. MACRO. Coll. Ex.
Starrett, Daniel, Box 326, R.D. 1, Parsippany. RHOP. Coll.
Treat, Asher E., 51 Colonial Parkway, Dumont. MACRO: esp. *Nemoria, Dichorda.* MICRO: esp. Eucleidae. Life History.
Wagner, Richard, 97 Franklin Rd., Teaneck. RHOP: esp. Nymphalidae, *Papilio.* MACRO: esp. *Catocala,* Saturniidae. Life History. Coll. Ex.
Zepf, Wm. Wright, 2 Mechanic St., Haddonfield. LEPID. Coll. Ex. Buy. Sell.
Ziegler, J. Benjamin (Dr.), 18 Baltusrol Place, Summit. RHOP: Lycaenidae, esp. Theclinae, Riodinidae. Genetics, Ecology, Distribution. Coll. Ex. Buy. Sell.

NEW MEXICO

Eyer, John R. (Dr.), New Mexico Agricultural Experiment Station, State College. MICRO: esp. Lyonetiidae, Hepialidae, Micropterygidae. Morphology, Life History. Coll. Ex.

STANDARD, O.D., 322 East Coronado Ave., Belen. RHOP: esp. Papilionidae of world. Coll. Ex. Buy. Sell.

NEW YORK

Beebe, William (Dr.), Zoological Park, New York 60. RHOP. MACRO. Ecology, Life History. Coll.

*Bell, Ernest L., 150-17 Roosevelt Ave., Flushing. RHOP: esp. Hesperiidae.

Bowe, John J. (Dr.), 1303 York Ave., New York City.

Buxbaum, Paul, 360 Central Park West, New York 25. RHOP: esp. Papilionidae. Coll. Ex. Buy.

*Casselberry, R.C., 55 Edgemont Rd., Scarsdale. RHOP: esp. *Papilio.* MACRO: esp. *Catocala.* Coll. Ex. Buy. Sell.

Duane, John P., 33 Grandview Circle, Manhasset.

Eisner, Thomas, 45 Lynwood Rd., Scarsdale. RHOP: esp. Riodinidae. Coll. Ex. Buy. Sell.

Farquhar, Donald W. (Dr.), 185 Claremont Ave., New York 27. RHOP. MACRO. Food Plants, Distribution, Life History, etc. Coll. Ex.

*FRANCLEMONT, JOHN G., Dept. of Entomology, Cornell University, Ithaca. MACRO: esp. Phalaenidae, Notodontidae, Lymantriidae. Life History. Coll. Ex. Buy.

*FREDERICK, ALBERT C., 6 Matilda St., Albany 2. RHOP: esp. Lycaenidae, Hesperioidea. Coll. Ex.

Gatti, Arthur, 63 W. Seventh St., Mt Vernon. RHOP. MACRO. Coll. Ex. Buy. Sell.

Gertsch, W. J. (Dr.), American Museum of Natural History, New York 24. Nearctic RHOP., esp. Lycaenidae.

Gillham, Nicholas W., No.4 Washington Square North, New York. RHOP: esp. Lycaenidae, *Melitaea, Euphydryas,* Hesperiidae. Coll. Ex. Buy. Sell.

GLANZ, A., 291 E. 98th St., Brooklyn 12.

*HEINEMAN, BERNARD, 247 Church St., New York 13. RHOP: of Jamaica. MACRO: esp. *Catocala.* Coll.

Hellman, Geoffrey T., 228 E. 61st., New York 21.

Hopf, Alice Lightner (Mrs.), 136 West 16th St., New York 11. Migration. Coll.

*KEJI, JOSEPH A., Biggs Hospital, Ithaca. MACRO. Life History. Coll.

*KELLNER, JOHN J., 41-03 171st St., Flushing, L.I. RHOP. MACRO. Coll. Ex. Buy.

*Klots, Alexander B. (Prof.), City College of New York, 17 Lexington Ave., New York 10. RHOP: esp. *Boloria, Colias.* MICRO: esp. Crambinae. Ex. Buy.

Kolyer, John M., 104 Renison Drive, Westbury. RHOP: esp. Papilionidae. MACRO.

Latham, Roy, Orient, Long Island. MACRO. MICRO. Parasites. Coll.
Coll. Buy.

*McELVARE, ROWLAND R., 26 Bogart Ave., Port Washington, L.I. MACRO: esp. Heliothiinae. Coll. Ex. Buy.

Marks, Louis S., Biological Lab., Fordham University, New York. RHOP: esp. *Papilio.* Coll.

Miller, Howard C., 222 N. Collingwood Ave., Syracuse 6. RHOP: esp. tropical Pieridae, Nymphalidae. MACRO. Coll. Buy.

Morris, John W., 2704 W. Genesee St., Syracuse 9. RHOP: esp. Papilionidae. MACRO: esp. Sphingidae. Life History. Coll. Ex. Buy.

*Nabokov, Vladimir (Prof.), Goldwin Smith Hall, Cornell University, Ithaca. RHOP: Holarctic; Lycaenidae. MACRO: Palaearctic.

Obraztsov, Nicholas S. (Dr.), 110 Maple Ave., Sea Cliff, Long Island. LEPID: esp. Amatidae, Tortricidae. Morphology of Genitalia.

Riley, Thomas J., Box 6, Brandywine Station, Schenectady 4.

*Rindge, Frederick H. (Dr.), American Museum of Natural History, New York 24. MACRO: esp. Geometridae. Life History. Coll. Ex. Buy. Sell.

*Rupert, Laurence R., Sardinia. MACRO: Geometridae esp. Ennominae. Life History. Coll. Ex. Buy.

SANFORD, LEONARD J., c/o Webb Realty Co., 101 West 85th St., New York 24. RHOP: of East Indies and New Guinea, esp. Pieridae. Ex.

*SHOUMATOFF, NICHOLAS, Box 333, Bedford. LEPID: of eastern U.S.A. and West Indies. Distribution, Morphology. Coll. Ex.

Shulgin, Michael, c/o Peters, Lake Road, Box 446, Valley Cottage. RHOP. and MACRO. of world. Coll. Ex.
*Spelman, M., 2781 Grand Concourse, New York 58. RHOP. Ex. Buy. Sell.
Wilcox, LeRoy, Speonk, L.I. LEPID. Coll. Ex. Buy. Sell.
*Zappalorti, Michael, 123 Androrette St., Charleston 9, Staten Island. RHOP. and MACRO: local and exotic. Coll. Ex. Buy. Sell.

NORTH CAROLINA

Covell, Charles V., Jr., Box 569, Southern Pines.
*Gottschalk, Carl W. (Dr.), Glen Lennox Apt. 47D, Chapel Hill. RHOP: esp. of Arctic. Pigment Metabolism. Coll. Ex. Buy. Sell.

NORTH DAKOTA

Adler, Julius, 407 Oak St., Grand Forks. Nearctic RHOP. Coll. Ex.
Oberfoell, Jim, Buffalo Springs.

OHIO

*BAKER, CLEMENT W., P.O. Box 455, Waynesburg. RHOP. MACRO. Coll. Buy.
Bock, Theodore, 70 Ehrman Ave., Cincinnati 20. RHOP: esp. *Ornithoptera, Papilio, Agrias, Morpho.* Coll. Ex. Buy. Sell.
*Braun, Annette (Dr.), 5956 Salem Road, Mt. Washington, Cincinnati 30. MICRO: esp. Tineoidea. Life History. Coll.
Chase, Hazel (Mrs.), 272 Union St., Galion.
Cobb, Robert B., 1109 Asbury Rd., Cincinnati 30. RHOP. MACRO. Coll. Ex. Sell.
*Ferguson, Elias A., 1213 Bellflower Ave. S.W., Canton 10. RHOP: esp. *Papilio.* MACRO: esp. *Catocala.* MICRO. Coll. Ex. Buy. Sell.
*Lindsey, A.W. (Dr.), Dept. of Biology, Denison University, Granville. RHOP: esp. Nearctic Hesperioidea. Taxonomy.
Romine, Ray, 954 Westwood Drive, Marion. RHOP. MACRO. Coll. Ex. Buy.
*Smalley, Stephen B., 6129 Glade Ave., Cincinnati 30. RHOP. Life History Photography. Coll. Ex. Buy.
Taylor, Herbert S., 1369 Fair Ave., Columbus.
Thomas, Edward S., Ohio State Museum, Columbus 10. RHOP: esp. Hesperioidea, Hair-streaks. MACRO: esp. *Catocala.* Life History, Distribution.
Thrasher, William, R.D. Route 2, Garrettsville. RHOP. and MACRO. of world, esp. Papilionidae and Saturniidae. Coll. Ex. Buy. Sell.
Welling, Edward C., 700 East 240th St., Euclid 23. LEPID: esp. *Speyeria, Melitaea,* Papilionidae, etc. Sugar-baiting. Coll. Ex.

OREGON

*Baker, James B., Baker. LEPID. Coll. Ex.
Jewett, Stanley G., 7742 S.E. 27th Ave., Portland 2.
Macy, Ralph W. (Prof.), Reed College, Portland 2. RHOP. MACRO. Biology, Taxonomy. Coll. Ex. Buy.
Scott, Leonard M., 6537 S.E. 83rd Ave., Portland 66.

PENNSYLVANIA

*ACKERMANN, OTTO, 639 Walnut St., Irwin. RHOP. MACRO. Coll. Sell (plastic mounts).
*Adams, J.W., 32 Pleasant St., Philadelphia 19. RHOP: esp. Nearctic Hesperiidae. Taxonomy; Distribution in Relation to Food Plants. Coll. Ex.
Brumbaugh, Norman J., 1808 Moore St., Huntingdon. RHOP. Coll. Ex. Buy. Sell.
*CARY, MARGARET M. (Mrs.), Ellet Lane and Wissahickon Ave., Mt. Airy, Philadelphia 19. MACRO: esp. Sphingidae. Life History. Coll. Buy.
*Clench, Harry K., Section of Insects and Spiders, Carnegie Museum, Pittsburgh 13. RHOP: Lycaenidae, esp. Theclinae. Evolution, Phylogeny, Systematics. Coll. Ex.
EHLE, GEORGE, 314 Atkins Ave., Lancaster. RHOP. Coll. Sell.
*Jay, William, 6358 McCallumn St., Germantown, Philadelphia. RHOP. MICRO. Buy.
Mergott, Winston B., 549 Oxford Blvd., Pittsburgh 16. RHOP. MACRO. Coll. Ex.
*MERKER, C.G., 1520 Cooper St., N.S., Pittsburgh 12. LEPID. Coll. Ex. Buy. Sell.
*Moyer, Howard C,., Box 238, R.D. 2, Sinking Spring. RHOP. MACRO. Coll. Ex. Sell.
Murchie, William R., Box 203, Sharon. RHOP. Coll. Ex.

*Napier, Arthur H., 503 E. Willow Grove Ave., Chestnut Hill, Philadelphia 18. Nearctic RHOP. MACRO: esp. Sphingidae, Arctiidae, Phalaenidae (*Catocala*). MICRO: of Pennsylvania. Coll.
*Peters, George, Adamstown. RHOP. MACRO. Coll. Ex. Buy. Sell.
PRESTON, FLOYD W., 526 Linden Rd., State College. RHOP: esp. Pieridae. Coll. Ex.
Rupprecht, Jerome (Rev.), St. Vincent Archabbey, Latrobe. RHOP. MACRO. Coll. Ex.
Stafford, Charles W., 1125 Tennessee Ave., Pittsburgh 16.
*Tietz, Harrison M. (Prof.), Dept. of Zoology, Pennsylvania State College, State College. MACRO: esp. Phalaenidae. Life History. Coll. Ex.

RHODE ISLAND

Dane, Benjamin, Indian Ave., Middletown. MACRO: Saturniidae, esp. Life History Photographs and Sexual Attraction. Coll. Ex. Buy.

SOUTH DAKOTA

Sweetman, Harry E., 300 N. Dakota Ave., Sioux Falls. RHOP. and MACRO: esp. of central northwest U.S.A. Life History. Coll. Ex. Buy. Sell.

TENNESSEE

Roever, Kilian, R.F.D. #2, Jackson.
Webster, Clarence G., 1500 Ridley Blvd., Nashville 4.

TEXAS

ANDERSON, C.A., 3209 Centenary, Dallas 5. RHOP: esp. *Danaus plexippus.* Life History, Migration.
Daly, Howell V., 2418 Gladstone Drive, Dallas 8. RHOP. MACRO. Coll. Ex.
*FREEMAN, HUGH A., 1335 Overhill Drive, Garland. RHOP: esp. Hesperioidea, Theclinae. Taxonomy, Ecology. Coll. Ex. Buy. Sell.
*Glick, P.A., Bureau of Entomology and Plant Quar., Box 143, College Station. RHOP: esp. Papilionidae. MACRO: esp. *Catocala,* Saturniidae. Aerial Insect Dissemination and Migration, Cotton Insects. Coll. Buy.
Kinch, Everard M., 4223 Jerry Lane, Fort Worth. RHOP. Coll. Ex.
Nations, A.W., Box 42, Donna.
*Orchard, C.D., Grayson St. Station, P.O. Box 242, San Antonio. Coll.
Reinthal, Walfried J. (Dr.), Terrell State Hospital, Terrell. RHOP: Nearctic and Palaearctic. Coll. Ex. Sell.
Ryan, Charlton (Miss), 1822 Huff St., Wichita Falls. RHOP. Coll. Ex. Sell.
*STRUCK, B., P.O. Drawer 271, Brownsville. RHOP.

UTAH

*Downey, John C., Biology Dept., University of Utah, Salt Lake City 1. RHOP: esp. Lycaenidae. Coll. Ex.
Phillips, G. Lyle, 2746 Adams St., Salt Lake City 15.
PHILLIPS, W. LEVI, 985 S. Third East, Salt Lake City 4. MACRO: esp. *Pseudohazis.*

VERMONT

Werner, Floyd G. (Dr.), Dept. of Zoology, University of Vermont, Burlington.

VIRGINIA

Blevins, T.B. (Dr.), 3513-A So. Stafford St., Arlington. RHOP: Papilionoidea, esp. Nymphalidae.
*NICOLAY, STANLEY S. (Lt. Col.), Qrts. R-5, Marine Corps School, Quantico. RHOP.: esp. Lycaenidae, Hesperiidae. Coll. Ex.
Rozman, Robert, 726 N. Buchanan St., Arlington. RHOP. MACRO. Coll. Ex.

WASHINGTON

*Anderson, Andrew, P.O. Box 192, Pateros. RHOP. Coll. Ex.
*Bauer, David L., 1103 Ballew Ave., Everett. RHOP.: esp. *Melitaea* of world; U.S. *Papilio machaon* group, *Anthocharis,* and *Glaucopsyche* races. MACRO. Bionomics, Distribution. Coll. Ex. Buy. Sell.
Carman, J.D. (Mrs.), Route 2, Sunnyside.
*COOK, WILLIAM C. (Dr.), 219 Newell St., Walla Walla. MACRO: esp. Phalaenidae. Ecology, Distribution. Coll. Ex.

*Frechin, Donald P., Route 5, Box 838, Bremerton. RHOP: esp. *Euphydryas, Mitoura.* MACRO: esp. Washington diurnals. Life History. Coll. Ex. Buy.
Henriksen, Emily (Mrs.), Route 1, Sunnyside. RHOP. MACRO. Coll. Ex. Sell.
*Hopfinger, John C., Brewster. RHOP: esp. Satyridae, Lycaenidae. MACRO: esp. Saturniidae. Migration. Coll. Ex. Buy. Sell.
Pearson, James C., 5441 Windermere Rd., Seattle 5.
*Whittaker, Robert H. (Dr.), Aquatic Biology Unit, Radiological Science Dept., General Electric Co., Richland. RHOP. Ecology, Distribution. Coll.
*WILSON, KENT H.,† 10015 Vinton Court, Seattle 77. RHOP: esp. Papilionidae. MACRO: esp. *Catocala.* MICRO: esp. Jugatae. Life History. Coll. Ex. Buy.
†Life Member.

WISCONSIN

*ARNHOLD, F.R., Route 3, Chippewa Falls. RHOP. MACRO. Coll. Ex. Buy.
Ely, Frank (Mrs.), Endeavor.
Euting, Neil A., P.O. Box 154, Okauchee. RHOP. MACRO. Coll. Ex. Buy.
*GRIEWISCH, LOUIS W., 114 Gray St., Green Bay. RHOP. MACRO. Coll. Ex. Buy.
Jablonski, Raymond, 1018 E. Ogden Ave., Milwaukee 2. RHOP: esp. *Papilio, Thecla.* Life History, Migration. Coll. Ex. Buy. Sell.
*MOECK, ARTHUR H., 301 E. Armour Ave., Milwaukee 7. RHOP. Coll. Ex. Buy.
Schirmer, George F., 2912 N. 45th St., Milwaukee 10. RHOP: esp. Papilionidae, Pieridae, Nymphalidae, Morphidae, Brassolidae. Coll. Ex. Buy. Sell.
*SIEKER, WILLIAM E., 119 Monona Ave., Madison 3. RHOP. MACRO: esp. Sphingidae, Saturniidae, Citheroniidae. Coll. Ex. Buy. Sell.
*Stauffacher, E.W. (Mrs.), 2208 12th St., Monroe. RHOP. MACRO: esp. Saturniidae. Life History. Coll Ex. Buy. Sell.
Throne, Alvin L., 3916 N. Maryland Ave., Milwaukee 11. MACRO. Coll.
Urban, James, 401 Porlier St., Green Bay.
Was, Howard E., 4118 W. Fairmount Ave., Milwaukee 9.
*ZIEMER, S.E., 715 Dorelle St., Kewaunee. LEPID. Coll. Ex. Buy. Sell.

WYOMING

DeFoliart, Gene R., 1117 Lewis Street, Laramie.
Downey, Duke, 51 West 4th St., Sheridan. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

SUMMARY

Honorary Members	5
Life Members	1
Sustaining Members	80
Regular Members	416
Institutional Subscribers	44
Exchanges and Library Gifts	25
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Nations represented	38

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The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

Active Members - annual dues \$3.00 (U. S. A.)
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Each year a list of all members of the Society is published, with addresses and special interests. The list is sent to all members.

All members are expected to vote for officers when mail ballots are distributed by the Secretary each year.

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The LEPIDOPTERISTS' NEWS

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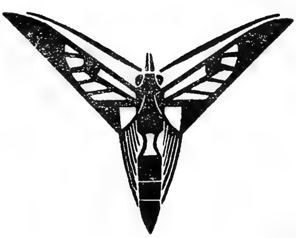

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MIGRATIONS OF *NYMPHALIS* AND OTHERS
PUPAL COLORATION OF *PIERIS*

(complete contents on back cover)

20 April 1953

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.*, mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.*, personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; latin names of genera and species will be italicized, and authors of such latin names WILL NOT APPEAR IN THE TITLE of any paper. The style should conform to that used in recent issues of the *News*. Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

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Address remittances to: Mr. S. A. HESSEL, Nettleton Hollow, Washington, Conn., U. S. A.

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THE LEPIDOPTERISTS' NEWS

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MINUTES OF THE THIRD ANNUAL MEETINGS OF THE LEPIDOPTERISTS' SOCIETY

The meetings were held from Wednesday through Friday, July 2 - 4, 1952, in the Science Service Building, Dominion Experimental Farm, Ottawa, Ontario. A total of 36 members and guests were present during the meetings.

The morning of July 2 was occupied in part by the registration of the members. The meeting itself was called to order by L. PAUL GREY, First Vice-President, in the absence of President KARL JORDAN. This was followed by a very nice welcoming address given by Dr. R. GLEN, Chief of the Division of Entomology. The meeting was then adjourned for lunch in the Experimental Farm cafeteria.

The afternoon was spent on a field trip to Kazabazua, Quebec. The various members and guests drove the forty-odd miles to the collecting site, arriving in mid afternoon. Several hours were spent collecting, and then the party returned, stopping at the home of H. G. CRAWFORD, Associate Chief of the Division of Entomology, for a picnic supper. The evening was spent visiting or collecting at lights on the fringes of the golf course near Mr. CRAWFORD'S house.

The meetings on Thursday morning, July 3, were presided over by L. PAUL GREY, and the subject matter was a symposium on "Collecting and Field Study of Lepidoptera." The following papers were presented:

1. Macrolepidoptera. J. G. FRANÇLEMONT, Washington, D. C.
2. Microlepidoptera. T. N. FREEMAN, Ottawa, Ontario.
3. The functions and problems of a museum collection. FREDERICK H. RINDGE, New York City.
4. Recent developments in light trap design. C. B. WILLIAMS, Harpenden, Herts, England (read by B. P. Beirne).
5. The Forest Insect Survey, with special reference to Lepidoptera. J. J. DE GRYSE, Ottawa, Ontario.

After the presentation of these papers, the meeting was adjourned for lunch.

The afternoon session was opened with an address by T. N. FREEMAN entitled "The history of the Canadian National Collection." Following this paper, the meeting was adjourned so that the members and guests could inspect this collection. Also included in the afternoon festivities was a trip through the insectaries on the Experimental Farm.

That evening the members and guests attended a banquet in the Experimental Farm cafeteria, followed by an address by A. ADRIAN ROBERTS, the High Commissioner for the Union of South Africa. Accompanying the address were several excellent color films, on the life and work of A. J. T. JANSE, and on several areas of South Africa.

The morning of Friday, July 4, was devoted to the presentation of several papers, L. PAUL GREY presiding.

1. Presidential address. KARL JORDAN, Tring, Herts, England (read by L. PAUL GREY).
2. Collecting in the British Isles. B. P. BEIRNE, Ottawa, Ontario.
3. Remarks on nomenclature. J. G. FRANÇLEMONT, Washington, D. C.
4. Some parasites of Lepidoptera. G. S. WALLEY, O. PECK, G. E. SHEWELL, Ottawa, Ontario.

The business meeting followed and was presided over by Vice-President L. PAUL GREY. The members present unanimously approved the amendments to the constitution, as given in *The Lepidopterists' News*, vol. 5: p. 111 (1952).

A discussion followed concerning the possible meeting places for the next annual meeting of The Lepidopterists' Society. It was recommended that the site be in the western part of the country, and the Los Angeles County Museum, Los Angeles, California, was suggested. The Secretary was instructed to make the necessary arrangements.

The Secretary was also instructed to send a letter of appreciation to the President of the Society, Dr. KARL JORDAN, for his presidential address.

It was then suggested that the Secretary express the appreciation of the Society for the fine hospitality and excellent facilities that were made available for this meeting by the staff of the Division of Entomology. This was duly presented and approved.

There being no further business, the meeting was adjourned for lunch.

The afternoon was spent on a field trip to the Mer Bleue, Ontario. The members and guests went by car, as on the previous field trip. Some of the members brought their supper along, and did some dusk and night collecting.

No formal meetings were held on Saturday, July 5, although the Canadian National Collection was available for examination and study.

Arrangements for the facilities and other tasks were handled chiefly by T. N. FREEMAN and E. G. MUNROE, together with B. P. BEIRNE, the Chairman of the Local Arrangements Committee. They did an excellent job, and made the meetings very successful.

The following members and guests signed the registration book: P. H. H. GRAY, B. P. BEIRNE, E. G. BAILEY, R. LAMBERT, J. G. FRANÇLEMONT, E. G. MUNROE, Mr. & Mrs. W. KAMP, Dr. & Mrs. F. H. RINDGE, T. N. FREEMAN, R. LEUSCHNER, Mr. & Mrs. F. R. ARNHOLD, L. PAUL GREY, G. EHLE, D. C. FERGUSON, O. PECK, Mr. & Mrs. G. R. WREN, W. HALIBURTON, S. WALLEY, C. W. WYATT, W. KRIVDA, BRO. ADELPHE, G. LEWIS, R. H. WIGMORE, B. A. MICHAEL, M. MACKAY, J. J. DE GRYSE, G. E. SHEWELL, H. TRIPP, R. GLEN, A. A. ROBERTS, W. E. VAN STEINBRUGH, and L. ST. LAURENT.

Respectfully submitted,
FREDERICK H. RINDGE
Secretary

SOME MEMBERS AND GUESTS ATTENDING THE MEETINGS

Seated left to right: Mrs. R. GLEN; L. P. GREY; H. E. Mr. A. ADRIAN ROBERTS; P. H. H. GRAY; T. N. FREEMAN (front); W. KRIVDA; J. G. FRANÇLEMONT; O. PECK; D. C. FERGUSON (front); R. LAMBERT.

Standing, left to right: R. GLEN; E. G. MUNROE; Mrs. O. PECK; R. LEUSCHNER; B. P. BEIRNE; Mrs. B. P. BEIRNE; G. EHLE.

PRESIDENTIAL ADDRESS

Ladies and Gentlemen, my dear Colleagues:

As circumstances prevent me from attending the Ottawa Meeting of the Lepidopterists' Society and officiating as its President, I send this letter to express my cordial good wishes to the meeting. A gathering of entomologists all deeply interested in an order of insects that is so attractive by the many scientific problems it presents for study and the beauty of colouring and design a multitude of species displays is bound to be enjoyable socially and profitable scientifically, and I much regret that I cannot be with you at Ottawa. Here I am instead in the Basses Alpes of France at a low altitude in a fruit-growing district, in pursuit of entomology assisted by my daughters. I am trying to sort the species of butterflies which flutter about us and to point out the species of which an additional series from this low locality would be welcome at home. When MENDEL'S results in plant-breeding were re-discovered at the end of the last century and Mendelism was claimed to solve the problems of the origin of species, the study of the species produced by nature was eclipsed, for as a prominent Mendelian said at an offical dinner, "we can now make species ourselves." This enthusiastic pronouncement sprang back into my mind when I contemplated the landscape and noticed a very striking contrast between the rows of apple- and pear-trees; the stems and branches were clean and glossy in all, but the foliage of the apple-trees was dry, only the epidermis remaining, the substance having been eaten by the caterpillars of one of the Microlepidoptera, the pear-trees being untouched. The Micro evidently had distinguished the two species of *Pyrus* from each other, and evolution had provided the female with the botanical knowledge to determine which species of plant was appropriate food for its offspring. The phytophagous insects have this kind of botanical knowledge, which is a primary necessity for them, the short-living insects having no time to learn by trial and error. What nature has done in this way for insects should imbue us with some respect for the knowledge of specific distinctions. Anyhow, I do not feel downhearted when remembering some species I have described; taxonomy, if reliable, gives biology a sound basis.

In my life-time, LINNÉ'S concept of the constant species has gradually been replaced by a concept embracing in most instances two or more populations which differ from each other in some way. Before the publication of the results of the explorations of the two famous entomologists (essentially lepidopterists) BATES (Amazonas) and WALLACE (Malay Archipelago), STAUDINGER had issued (1861) a catalogue of the European Lepidoptera in the Introduction of which he restricts the term *var.* (*varietas*) to the geographical variety and says that this sometimes is so different that one may be in doubt whether it is a variety or a distinct species, using for it the term "spec. dist?." In the next issue of the *Catalogus* (1871), after Darwin's theory had become generally known, he replaces "spec. dist." by "sp. Darw.," species Darwiniana, and thus deliberately introduces evolution into taxonomy. It would be an interesting study for some lepidopterist to compare the taxonomic ideas as they existed in 1870 in various classes of animals with the concepts the

lepidopterist STAUDINGER defined in his *Catalogus.* I think he has priority, which does not mean that the names of his concepts have to be accepted.

One of the terms employed by STAUDINGER is of special interest; his *"var. et ab."* is used when the *"var."* (now=subspecies) is defined by a character obtaining in all specimens of the population (=*"var."*) and occurs also in one or more specimens of another population (the specimens differing therein from the others of the population, therefore = *"ab."*). At that time *"vars."* were generally distinguished from each other by some difference in colour or pattern or wing-shape. Specimens of a subspecies which resemble another subspecies have usually been looked upon as connecting the two subspecies, and Julian Huxley has introduced the term "cline" for this variation, which includes specimens intermediate in character and usually also intermediate geographically. But a subspecies is usually distinguished by more than one difference, and it may happen that a cline A-B-C arranged according to distinction *n.* will be a cline B-A-C arranged according to distinction *z.* As an illustration of *"var. et ab."* I will refer to the ♂♂ of the African *Papilio dardanus.* In East Africa the fore- and hindwing have a broad black band and the ♂-claspers have a tooth on the inner side; in the West-African subspecies the band is much reduced, interrupted, and the tooth of the clasper is absent, only a few speciemens having a short tooth. In Uganda we find a more or less intermediate population. This is a cline in two characters, but if the populations of Tanganyika and South Africa are included (both with tooth on clasper), the cline in the amount of black on the upperside of the wings is much less steep than that in the development of the tooth. Incidentally this example of variation shows that the tooth of the clasper is *not* correlated with the breadth of the black band, the West-African specimens with the black band exceptionally broad have no clasper-tooth, and the specimens of *P. d. polytrophus* (from the highlands north of Nairobe) with the band strongly reduced have the tooth as well developed as specimens of *polytrophus* with broad band.

This question should be further studied, especially in Nearctic and Palearctic species in which at least two independent (non-correlated) characters distinguish the subspecies from each other. It is a straightforward morphological study without great difficulty, if one can gather together the necessary series of specimens.

The problems of evolution which can conveniently be studied in Lepidoptera are numerous. But enough of it; I must stop suggesting what one or the other of you might do. Talking of these problems unburdens my mind, for I should have liked to try to solve them myself if there had not been many other matters which required my attention and consumed my time.

I conclude therefore, and repeat that you have my most cordial good wishes for a successful meeting.

With kindest greetings to all

Yours very sincerely

(signed) H. E. KARL JORDAN

A NOTE ON THE COLORS OF PUPAE OF *PIERIS RAPAE* DEVELOPED UNDER ARTIFICIAL CONDITIONS

by P. H. H. GRAY

Ford (1945) states that the pupae of some butterflies "are either thought or known to be affected by their environment, but the subject is not well understood ... [and] ... is in need of further investigation." Poulton (1887) made a comprehensive series of experiments on *P. rapae* as well as on other butterflies; the backgrounds upon which the larvae pupated varied, as also did the amount of illumination. Scudder (1889) summarized Poulton's results, stating "white produced light chrysalids, . . .dark red produced dark chrysalids; deep orange very light green chrysalids". Harrison (1928) stated "It has ... long been known that the pigmentation of the pupae of the ... lepidopterous species ... *P. rapae* (Poulton 1887), is influenced by the colour of the light to which the larvae ... are exposed just before pupation." Harrison experimented, however, with mixed broods of *P. napi* L. Recently Harrison (1951) bred a hybrid between *P. napi* and *P. rapae* and recorded that "Practically the whole of the thirty one chrysalids were, as might have been anticipated from their surroundings, light green in colour." (The cages were of white muslin net with Windolite tops.)

In 1951 the writer placed two series of eggs, each series from a separate female *P. rapae,* in closed one-pint ice cream cartons, in a basement receiving weakly diffused daylight. The temperature varied only between 68° and 72° F. The stem of the food-plant passed through a hole in each carton into a jar of water.

EXPERIMENT 1: This began with 100 eggs laid by one female on *Arabis.* After 17 days in the cartons the larvae were moved, in batches of 7, into 6 one-quart sealer jars for a humidity test; 13 larvae were kept in a carton. 41 pupae developed from these 55 larvae. The colors of the pupae did not appear to have been affected by the various moisture conditions. The colors, judged about 48 hours after pupation, were as shown in tabular form below.

Flesh, and flesh with green tinge	8	Green	2
Gray	1	Grass green	2
Gray-green	7	Sap green	1
Light green	2	Brown	2
Same, pink tinge	2	Red-brown	1
Emerald green	3	Black-brown	1

The colors of the other 9 were not recorded. 18 of the pupae were thus mainly green. It may be of interest to note that shortly before eclosion all of the 13 pupae in the carton changed to light flesh-color with light green abdomina. The empty shells of all the pupae were light flesh-color, ex cept those in the carton, which retained the green color on the abdomina.

EXPERIMENT 2: Larvae reared in cartons from eggs laid by another female on *Barbarea vulgaris* L. (Winter Cress) yielded 39 pupae, which were colored as follows:

Gray-pink	1	Sap green	2
Gray-green	7	Dull green	13
Green	8	Dark green	6
Grass green	1	Gray-brown	1

37 out of the 39 were thus some shade or hue of green.

EXPERIMENT 3: About 120 eggs were collected at random on leaves of *Barbarea* growing wild. The colors of 31 pupae that formed in jars were as follows:

Gray-green	8	Blackish green	5
Green	6	Brown	10
Brownish green	2		

A large proportion of dark pupae thus developed in this random population. It was not possible to compare this set with wild pupae, for careful search among the leaves of the wild *Barbarea* revealed only 2 well-grown larvae, in spite of energetic laying by many butterflies.

Pupation dates were from July 31 to August 14; emergences from August 14 to 23, 1951.

These few experiments show that larvae of *Pieris rapae,* reared on their preferred foodplants in nearly complete darkness, or in diffuse daylight, yielded pupae which varied greatly in color. The colors of the pupae thus appeared to be independent of the background. The causes for such varied coloration may have to be sought in the hereditary constitution of the insect.

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Box 236, Macdonald College, Quebec, CANADA

RESULTS OF GONADECTOMY AND GONADAL TRANSPLANTATION IN THE SEX RACES OF *LYMANTRIA DISPAR* [1]

by SAJIRO MAKINO and KAZUO SAITO

In vertebrate animals, there is a well-known interrelationship between the hormone and sexual phenomena. Very little has been known of insects in this field however, and a number of important problems have remained unsolved. The poor status of evidence available calls for experimental study in this field. This induced us to undertake experiments of gonadectomy and gonadal transplantation in *Lymantria dispar* L., which is remarkable in showing "weak" and "strong" sexual races. Here we wish to present some essential results derived from our experiments. The detailed quantitative data together with the experimental procedures and discussion will be reported elsewhere in the near future.

The present experiments consist of gonadectomy and gonadal transplantations carried out using the larvae of the weak and strong races of *Lymantria dispar.* The larvae derived from a single egg-mass were used in each series of experiments, and were operated at ages ranging from the 4th to 6th instars.

A. GONADECTOMY

The adult males which emerged from gonadectomized larvae belonging to the strong race were a little dark in the coloration of their wings and thoracic and abdominal segments, as compared with the non-operated animals from the same race. The ovariotomized females showed no visible difference in their bodily coloration from the normal ones. In both cases, the characteristic structures, such as the frenulum, antenna, and genitalia, of the gonadectomized animals, presented also no appreciable change. Especially, the male genitalia appeared to be normal and permitted regular copulation in most cases.

B. GONADAL TRANSPLANTATION

The gonadal transplantations concerned here involved two different schemes of experiments.

1. Testicular and ovarian transplantations without gonadectomy were carried out in the larvae of the same races, and between the weak and strong races reciprocally; in every case the gonads of the host were not removed. The results of these experiments indicated that both testicular and ovarian transplantations were without effect on the bodily characters of the host which received the grafts. Various external organs, such as the frenulum, antenna, and genitalia, of the host remained unchanged, except that, in a few males of the weak race, the fore wings betrayed a tendency of lighter coloration than those of the control animals.

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[1] The experiments were done in the Zoological Institute of the Hokkaido University, Sapporo, Japan, and the manuscript was prepared by the senior author during his stay at the Osborn Zoological Laboratory of Yale University, New Haven, through the generosity of Dr. C. L. REMINGTON, to whom the senior author is greatly indebted for reading the manuscript.

2. Reciprocal gonadal transplantations were carried out between the larvae of the weak and strong races, following the removal of the gonads of the host, that is, the ovaries or testes of the animals from the strong race were implanted in the animals of the weak race after removal of their testes or ovaries. The female animals of the weak race which were ovariotomized and received the ovarian or testicular grafts derived from the strong race, or the male animals of the weak race which, after testis-removal, were grafted with the ovaries or testes derived from the strong race, presented in every case no appreciable change in their bodily characters after emergence. The various external organs which concern the secondary sexual characters were apparently without change in all experimental animals. Thus the ovarian and testicular grafts implanted in the gonadectomized animals did not influence the sexual characters of the host in the reciprocal tranplantations between the weak and strong races.

C. THE SEXUAL BEHAVIOR OF THE OPERATED ANIMALS

The sexual behavior of the operated animals was observed through the process of copulation and of egg-laying. So far as the scope of this study is concerned, the operated animals acted just like the control animals in their sexual behavior. For instance, the males without testes copulated in a regular manner when mated with the normal females, which laid eggs after copulation with a deposit of the tufts of woolly abdominal hairs as usual. Also, the ovariotomized females copulated with the normal or gonadectomized males as usual, and showed after copulation the usual egg-laying behavior, but of course deposited the tufts of woolly hairs only. Further, the females which received testicular grafts following ovariotomy, mated with males in which the testes were removed, and tried after copulation to lay eggs, ending with the deposit of the tufts of woolly hairs.

In conclusion, from the results of our experiments it can be said that both gonadectomy and gonadal transplantations carried out between the weak and the strong races of *Lymantria dispar* bring about no alteration of the external sexual characters, and further that the operated animals showed normal sexual behavior in the acts of copulation and egg-laying.

Zoological Institute, Hokkaido University, Sapporo, JAPAN

NOTES ON A MIGRATION OF *NYMPHALIS CALIFORNICA*

by R. H. Whittaker

During a trip to California this fall I was fortunate enough to observe one of the great migrations of *Nymphalis californica* Bdv. in a number of locations. While I did not attempt to make exact or extensive records, it occurs to me that my notes may be of value when combined with the data of others.

Aug. 13, 1952, Richland, Wash. While working on an insect community sample, in the middle of the extensive sagebrush semi-desert, one *Nymphalis* was observed to fly over the study area, moving toward the west, during 3½ hours of observation time.

Aug. 13-15, Richland, Wash. During 170 miles of road travel at 50 mph., three *Nymphalis* were observed flying across the road ahead of the car. Two of these flew across the road toward the west; one, however, crossed in the reverse direction. One-half of the three hours' observation time may perhaps be ruled out, since none were seen in the morning travel, 0700-0800, when they were presumably inactive. Since the *N. californica* seemed extraneous to the local sagebrush community, these indications of a migrant population, sparse as it was here, aroused my suspicions that we might be on the fringe of a major migration.

Aug. 16, on the highway from Richland south to Biggs Junction and Bend, Ore. Occasional individuals were seen along the road while in Washington in the morning, with population densities appearing to be of the same order as the very sparse migrant population at Richland. During the afternoon, while travelling south to Bend in the level lava and open pine forest country, it was observed that the frequency of the butterflies had much increased.

Aug. 17, on the Bend-Klamath Falls highway east of Crater Lake. In this area of fairly level terrain, Ponderosa and Lodgepole Pine forests, the density of the butterflies had so increased as to make the magnitude of the migration evident. A road count of *N. californica* seen crossing the road ahead of the car, close enough to be recognizable, was made for 5 miles travelling south at 50 mph. 90 *N. californica* were counted crossing toward the west, 9 back toward the east. The butterflies could often be seen caught in the eddies behind cars travelling in the opposite direction and observed on the radiators of older models, and many dead and stunned butterflies could be seen on the road.

Aug. 17, Crater Lake National Park, afternoon. Driving west from the main highway up to the Cascade Divide and Crater Lake the migrant population, already so dense outside the Park, increased to levels beyond anything I had ever seen. As one drove one butterfly after another would be carried up over the windshield or caught in the air currents around the car. Dead butterflies littered the road, wherever they had not been swept off by the eddies from passing cars, and the banks between the roads and ditches. Small windrows of *N. californica* had formed along the road in some places near the Park entrance where air currents from cars had swept the dead butterflies off the road and deposited them beside it.

One of the assistant park naturalists informed me that the migration had been in progress for three weeks and was already past its peak, and that it was his belief the butterflies were migrating up from the lower lands to the east into the Park to concentrate there, and die there. I had no chance to talk to Dr. RUHLE, Crater Lake Park Naturalist, but would urge anyone interested in the migration to write him; he probably has good notes on it.

Aug. 17, on the rim of Crater Lake, early afternoon. The *Nymphalis* were denser here than anywhere else I observed them. A ten-foot line was marked off on the lip of the rim overlooking the lake on the southeast side, perpendicular to the rim's circumference. In five minutes observation time, 98 *N. californica* crossed this ten-foot front flying toward the southwest, only 1 back toward the east. With a speed of flight that appeared to be around 5 mph, some rather staggering numbers of butterflies were necessary to maintain such a population in motion for a good many days over an extensive area.

Aug. 18, Siskiyou Mountains of southwestern Oregon, in vicinity of Oregon Caves National Monument. The *N. californica* were abundant in the Douglas fir-sclerophyll forests of these mountains; but no directional movement could be observed, and no count was felt feasible. I have spent parts of three summers in intensive field work in these mountains; the population observed Aug. 18 was far in excess of anything I had seen there previously.

Aug. 18-20, south from the Siskiyou Mountains along the Redwood Highway and down the outer coast to San Francisco. Decreasing numbers were seen in the mountains as we travelled out to the Coast. No *Nymphalis* were observed along the outer coast.

Aug. 26-29, Yosemite and Kings Canyon National Parks. Occasional *N. californica* were seen in the mountains, but not in numbers which seemed abnormal or suggested migration.

Aug. 31, Strawberry Mountains, Ore. The butterflies were observed to be common in the forests, without apparent directional trend in flight. A road count over 39 miles between John Day and Long Creek gave 12 individuals, 6 crossing the road from west to east, 4 from east to west, 2 in flight parallel to the road.

Sept. 1-15, Richland, Wash. Occasional *N. californica* were seen, their numbers being smaller than Aug. 7-15. I was told by an associate here that they were more numerous while I was gone than before or after my trip.

Sept. 24, Richland, Wash. The last *N. californica* seen crossed the sagebrush sampling area during the morning, in frantic and erratic flight as the abundant fall asilids of the desert rose, one after another, to try to intercept it, like so many pursuit planes after a bomber.

Biology Section, Radiological Sciences Dept., General Electric Co.,
Richland, Washington, U. S. A.

OBSERVATIONS OF *CELERIO LINEATA,* THE WHITE-LINED SPHINX, IN UTAH

by George F. Knowlton

Some seasons larvae of *Celerio lineata* (Fabr.) have become extremely numerous in many parts of Utah. On several occasions, migrations a mile or two long have been observed, moving across a highway in range country. Usually such large larval movements have followed the cleanup of the choice host plant—often Knotweed. Great numbers of these huge larvae have fed in small-grain fields of Utah on Knotweed, then moving to succulent Russian Thistle if necessary, generally without feeding at all on the grain plants. In 1949, the writer scarcely visited a county agricultural agent at his office, during June or July, who did not immediately reach for a bottle or can of these large larvae to ask concerning them. Report sheets submitted to the U.S.D.A. Bureau of Entomology and Plant Quarantine, Insect Pest Survey, were returned to me for review by Kelvin Dorward, now in charge of the Economic Insect Detection and Reporting Section. These sheets formed the basis for the following information:

1930: Larvae of *Celerio lineata* caused moderate damage to tomato plants in several tomato growing areas of Utah.

1935: Larvae of the White-lined Sphinx Moth were unusually abundant upon range plants and weeds this spring and early summer. Grape and Virginia creeper vines were stripped of foliage upon two farms at Granite, in Salt Lake County. Slight damage to dewberries, peas, rose, elderberry and lilac foliage also was reported or observed. Larvae damaged acceptable range plants in various parts of Grand County, several farmers reported.

1939: On June 8, larvae of *C. lineata* were abundant on range lands near farms north of Brigham City, in Box Elder County. These larvae damaged grape foliage at Pleasant View in northern Utah on June 15, and also attacked grapes at a farm in the vicinity of Rock Canyon, Utah County, on June 30. Two tomato fields in southern Box Elder County were devastated by a great army of sphinx moth larvae, reportedly this species. About 30 acres of tomatoes were stripped by horn-worms in a march which swept everything before them. The area of this attack was just north of the Utah Hot Springs.

1940: On October 12 it was reported that larvae of *C. lineata* had seriously damaged evening primrose in flower gardens at Logan during the 1940 season. Adult moths had been abundant about flower gardens during many evenings.

1941: On May 28, larvae of this sphinx moth were abundant in the area from Woodside to Greenriver, on range land. They also were abundant about 5 miles west of Greenriver where much Russian Thistle and some other range plants had been stripped from the borrow pits along the highway. Three to six larvae per square yard, of all sizes, still were present on range weeds. A shining black tachinid (probably *Theleria nigripes*) apparently was parasitizing many of the larvae. A heavy infestation of these horn-worms also was present on range lands in Pleasant Valley of Duchesne County, on June 25. Larvae commonly were present along roadsides, often one to three per square yard, defoliating certain range plants.

1944: A number of extensive outbreaks of the larva occurred in various parts of Utah. Great numbers of these horn-worms moved across highways and roads in Millard County, some large movements crossing the highway south of Lynndyl. In north Ogden, large numbers moved from range land to damage tomato fields. In Salt Lake City they moved in great numbers from range and military reservation lands to damage flowers and some victory garden plants. Much concern was shown by nearby home owners when this large movement occurred, and continued for several days.

1949: On June 20, larvae of *C. lineata* were observed migrating across highways in parts of Millard County, especially south of Lynndyl, and in Box Elder and Beaver Counties. Some concern was expressed by ranchers in outbreak areas. Hordes of larvae were present on dryland farms east of Monticello, on June 29. Most of these fed on weeds until the preferred weeds became exhausted. On July 11, larvae reportedly were damaging grape foliage in two localities, and feeding on weeds in many communities and farms in Utah County. Damage from them was reported to alfalfa on one farm at West Mountain, Utah County. At American Fork they reportedly stripped foliage from Boysenberry bushes, sand lilies, and grapes. A very large movement of larvae was observed to cross the highway in Garfield County on July 13. On July 14, the sphinx moth larvae were numerous in spots around Paragonah, Parowan, Cedar City, Kanarraville, and on range land north of these communities, also on range land in the south end of Beaver County in some spots. These were feeding chiefly on Knotweed and succulent Russian Thistle. Still quite a few of these worms were about, but fewer than a few weeks earlier, in most Tooele and Salt Lake County farm and range areas examined on July 16. By August 7 the very extensive outbreak had largely subsided. "Horrified" dryland farmers usually suffered little crop injury from this horn-worm, but fear was great among farmers and home gardeners in many counties and communities of Utah.

1950: *C. lineata* larvae were not in outbreak numbers this year. However, adults frequently were seen about garden flowers in late afternoon at Logan, Garfield, Tooele, Provo and Salt Lake. They also were moderately numerous about "Rocky Mt. Bee Plant" blossoms in range land areas.

1951: The sphinx larvae were observed in numbers in flower gardens west of Nephi, but were not causing much damage. However, some damage was reported from them in one flower garden at Delta on September 6.

1952: This was another outbreak season for *C. lineata.* On June 3, larvae were extremely numerous in waste areas and moving into gardens and orchards in several parts of Utah County. Large populations were noted on range lands and on Knotweed and Russian Thistle in weedy grain areas of Millard and Utah Counties on June 14. Many farmers showed concern about these large caterpillars. Hordes of these horn-worms crossed the highway 8 miles north of Delta on June 5, in a two-mile strip. Others crossed the highway nearer Lynndyl to the north. On June 6, larvae invaded many home gardens as the Knotweed food supply on which the larvae had fed became exhausted. Hundreds of home owners in the Salt Lake, Holladay, East Mill Creek, and Sandy area became much concerned. Some flowers and home gardens were damaged during the period from May 29 to June 6. Great hordes of these larvae were observed in West Tremonton and Garfield on June 7, but feeding chiefly on Knotweed. Nearly every day calls concerning these larvae reached the writer's desk. Hundreds of larvae were crossing the highway, over a strip one-fourth mile long, on a range land area a few miles north of Greenriver on June 10. The horn-worms also were very numerous in Sanpete and Sevier Counties in a few large areas, including range land south of Monroe, and north of Gunnison along the highway. On June 12, the sphinx larvae were very numerous on farms and range lands at Kanarraville. They also were present in smaller numbers elsewhere in Iron County. Larvae were abundant along and crossing the highway near Jericho on June 17. They were very numerous on some dryfarms at Clarkston, largely feeding on Knotweed, June 18. Larvae were crossing the highway at a few places in Millard and Tooele Counties in moderate numbers. Numerous larvae in fields in Kane County were nearly always on Knotweed. On June 27 these horn-worms were numerous on range land flats and on some farms west of Salt Lake City, while scattered outbreaks also were noted in Juab, Uintah, and Duchesne Counties at this time. However, these outbreaks on this date were less extensive than those which had occurred during May and in early June. Numerous inquiries were received at the writer's office on July 7 concerning these large, conspicuous larvae which usually were present on Knotweed or Russian Thistle in many small grain fields, vacant lots, and along roadsides. At this time they were numerous in some pasture lands west of Logan. However, the larvae had become less numerous than a month before in most parts of Utah. Still, the population remained well above normal for this time of year. Damage to grape foliage from larvae was reported from Vernal on July 17.

Utah State Agricultural College, Logan, Utah, U. S. A.

A MIGRATION OF *ASCIA MONUSTE* IN MISSISSIPPI

by BRYANT MATHER

The southern border of the state of Mississippi extends along the Gulf of Mexico in a generally east-west direction for a distance of about 75 miles. Mrs. MATHER and I spent 2½ days there on 13-15 June 1952, and during this period we saw several hundred *Ascia monuste* (L.). I took 19 specimens, 8 males and 11 females (1 light, 10 dark - form "phileta"). Our observations were made near Gulfport and Biloxi, Harrison County, and Ocean Springs, Moss Point, and Pascagoula, Jackson County. One specimen was taken on 13 June, 10 on 14 June, and 8 in approximately 1 hr. on 15 June. Previous mention of this species specifically in Mississippi has been made only by Hutchins (1933) whose only comment was "Uncommon". I know and have seen only one previous specimen, a male I took at Clinton, Hinds County (200 mi. north of the Gulf), on 14 May 1950. On previous trips to the Gulf Coast, notably on 23 September 1951 and 2-4 May 1952, we looked for *A. monuste* but did not find it.

Our first observations were made on the morning of 13 June from a north-south road near Magnolia State Park (Jackson Co.). Only a few were seen, moving west to east; none were taken. Later that day one female was taken at the Gulf Coast Research Laboratory near Ocean Springs. On the morning of 14 June we noticed one resting in a vacant lot in urban Biloxi, on the street nearest the beach. During the next hour approximately 10 passed this point flying rather briskly west to east, and we took several. Later in the day small numbers were seen near the localities in Jackson County mentioned above, and two were taken near Ocean Springs; all seemed clearly travelling eastward. In the afternoon, about 4:30 P. M., others were seen at the same urban locality in Biloxi, and we took several more. Our impression was that both the speed and the frequency at which they were passing in the afternoon had increased slightly over that of the morning.

The most striking phenomenon was observed on Sunday morning 15 June on U. S. Highway 90 between Gulfport and Long Beach (Harrison County). From about 10:00 to 11:00 A. M. we watched them passing in a more or less steady stream. Our impression was that the speed of the individuals as well as the frequency had increased over the previous day. Our estimate of the average frequency was about one per minute, although sometimes a group would pass and then there would be a lull of two or three minutes. The direction of movement was strikingly constant and, in so far as we could tell, precisely parallel to the highway, which is here separated by only a wide shoulder and sidewalk from the sea wall and beach to the south and bordered on the north by lawns and residences set well back from the road. Our impression was that the path through which the insects were moving was relatively narrow. None were seen voluntarily to travel on the beach side of the sea wall and few seemed to travel as far inshore as the fronts of the houses. None were seen on any of the three days when we were more than a half mile from the shore. When one was deflected over the sea wall by being pursued it apparently did so by altering its course 45 degrees to the south until it had eluded its pursuer, then turning 90 degrees to the north, flying until it had intersected the projection of its previous

course, then turning 45 degrees to proceed. Traffic on the road was fairly heavy. Many of the butterflies seemed actually to be following the painted centerline of the road about 3 ft. above the pavement. All seemed equally agile in eluding moving vehicles, pursuers, and stationary obstructions, with a smooth detour and a rapid resumption of their original course. Their speed is estimated at between 8 to 10 mph, since it became apparent after the first few passed by that unless an individual was taken as it passed it was useless to chase it on foot. Eight were taken at this locality, 2 males and 6 dark females.

During the entire period that we were in the region the weather was calm, sunny, and hot (daily maximum about 100 F.); at no time was there noticeable wind.

Centers of *A. monuste* population apparently exist both east and west of Mississippi; and perhaps within the state. The "Gulf Coast" is mentioned in the range by several authors. *Ascia monuste phileta* (*sic*) is stated by Jung (1950) to be "the most common of the white pierids in residential New Orleans." Therefore it cannot be stated whether those observed in migration were "going" or "coming". If the life span is but 4 to 12 days, as suggested by Nielsen and Nielsen (1950), it is difficult to imagine that one individual would migrate any considerable distance and also return.

The observed behavior is in accord with the brief notes by Klots (1951, p. 202) and the detailed studies by Nielsen and Nielsen. The latter authors also noted that the level of movement is relatively low, 3 to 10 ft. above the ground; that the direction often parallels a coast line; that the migration lasts one to two days; that the stream varies in width from 10 to 100 yards, and that the speed is of the order of 10 mph.

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P. O. Drawer 2131, Jackson, Miss., U. S. A.

NOTES ON THE MIGRATION OF *NYMPHALIS CALIFORNICA*

by KENNETH M. FENDER and JAMES H. BAKER

Considerable study has been made on the migration of butterflies. The present knowledge is nevertheless so inadequate that continued reports and notes on any such insect phenomenon are desirable. It is for this reason that the following notes are offered.

In August of 1952 a vast migration of the California Tortoiseshell (*Nymphalis californica* Bdv.) occurred in Oregon. The heaviest flight of the migration was apparently near Bend where newspapers reported cars being stopped as radiators clogged up with these insects.

FENDER, August 9 and 10, observed large numbers of the insects as he crossed the state from the west slope of the Cascade Range until he approached Baker. Not knowing of the flight, he paid little attention until he was in the open country of eastern Oregon where a typical flight pattern was readily evident. The insects were flying in a north to northwesterly direction. The flight was rapid and the insects appeared to pay little attention to the east-west vehicular traffic. Time did not then permit any attempt at a count.

On August 13, Dr. C. P. ALEXANDER, Miss JUDY BAKER, and the authors studied an eastern fringe area of the flight. The sector was near the summit of the Elkhorn Range of the Blue Mountains, above Anthoney Lake (30 miles northwest of Baker) and at an elevation of about 7500 feet.

Four series of counts were made using three counters and a timer. During the first series FENDER acted as timer and the other three were timed by JUDY BAKER. The counters were separated by equal distances measured in paces. Each counted the butterflies passing between him and the next counter or a fixed object for a period of one minute.

	Counters						
Count	Alex.	Judy B.	Jim B.	Fender	Separation	Time	Wind
1	28	18	23		15 steps	12:00M	mild
2	8		11	11	10 steps	12:15PM	mild
3	23		16	16	15 paces	3:10PM	moderate
4	22		7	11	15 paces	3:15PM	brisk

The flight was from southeast to northwest and against a crosswind. It is unfortunate that more time, better facilities, and less primitive methods were unavailable. However it is hoped that the brief records will be of some import to some compiler of butterfly migration data.

Later, in the Wallowa Mountains to the east, additional specimens in moderate abundance were seen but with no visible indication of a flight pattern. The species has been more abundant than usual in the Willamette Valley to the west but once again with no apparent integrated flight. The migration apparently extended from about the summit of the Cascade Mountains to the Elkhorn Range of the Blue Mountains, a lateral expanse of some 180 air miles.

Route 3, McMinnville, Oregon, and Baker, Oregon, U. S. A.

THE *KARANASA* BUTTERFLIES — A CRITICAL REVIEW

by E. G. Munroe

The sumptuous work of A. Avinoff and W. R. Sweadner entitled "The *Karanasa* Butterflies, a Study in Evolution" *(Annals Carnegie Museum,* vol. 32, art. 1: 250 pp., 17 pls.; 1951) will stand as a worthy monument to its authors. The way that tragedy struck twice during the preparation of the work, preventing each of the authors from seeing the finished product of his labours, is narrated in a brief memorial note at the front of the volume. It is our good fortune that Dr. Sweadner was able to see and correct the final proofs of the book, which he did with rare devotion on what proved to be his death-bed.

Those who had the privilege of knowing Dr. Avinoff and Dr. Sweadner will see their personalities reflected in the content and composition of their monograph. Dr. Avinoff's zeal and imagination, his ability to surmount apparently insuperable difficulties, his love of the romantic aspects of lepidopterology, and his life-long enthusiasm for the fauna of central Asia are all shown in the very choice of the project, which occupied his attention for many years. These qualities, together with a fine historical sense, a close acquaintance with the foremost lepidopterists of Russia and western Europe, an intimate personal knowledge of the remote and desolate region which forms the habitat of *Karanasa,* a remarkable command of the English language, a passion for detail in taxonomy, and an outstanding technical ability in all that pertains to the production of both text and illustrations of fine books, made Dr. Avinoff's contribution to the study a dominating one. To these already great resources were added Dr. Sweadner's broad background in biology, his painstaking methodology, and his carefully considered and highly original ideas on species-structure and speciation.

The result is a treatise which represents more than merely a detailed study of a restricted group of butterflies from the Pamir region. On the one hand it is a volume that is reminiscent of the traditions of a more opulent era: one which might well have appeared as a Romanoff "Mémoire" or an Oberthür "Étude"; on the other hand it is a valuable and provocative contribution to the study of evolution and species relationships.

As a monograph and a guide to the identification of the butterflies of the group *Karanasa,* the book leaves little to be desired. The populations are for the most part clearly differentiated, and are described and figured in the most exhaustive detail. Some of the named populations are known only from very short series, but in every case of this kind there is reason at least to suspect that a distinguishable entity exists. The authors are, moreover, careful to specify that their naming of these forms is tentative, the aim being to avoid confusion of poorly known but possibly distinct forms, such as has so often caused trouble in the past.

The higher classification adopted, and the associated evolutionary interpretation, are, however, likely to prove more controversial. Since this book is certain, because of its importance for students of speciation and zoogeography, to attract attention far beyond the comparatively limited circle of those interested in the butterfly fauna of central Asia, I feel that a brief discussion of these more general aspects will not be out of place here.

The authors, with considerable justification, adopt as the basic units of their classification the smallest recognizable populations. These populations, each considered to be separated from all others by geographic, altitudinal, or reproductive barriers, are named, and are treated as subspecies. The higher classification is achieved by grouping the unit subspecies in four ranks of successively more inclusive categories. In some cases the second, in other cases the third, of these ranks is taken as being equivalent to the species, but the authors make it clear that they regard the species as a purely nomenclatorial concept, which has, in this group at least, no real counterpart in nature.

Before this general conclusion can be examined, we must consider the subspecies grouping in greater detail. The highest category of Avinoff and Sweadner's scheme, the "fifth category" or "division", provides a convenient basis for such a consideration. Avinoff and Sweadner recognize five divisions. Each is morphologically characterized; each occupies a definite part of the Pamir mountain-system; the range of each definitely overlaps that of one or more other divisions, and in such zones of overlap the members of the sympatric divisions are always clearly distinct. Within the divisions, on the other hand, the relationships of the subspecies are complex and often obscure. For this reason, an individual discussion of each division is desirable.

At this point I must mention certain deficiencies of presentation that make critical analysis of the taxonomic arrangement difficult. One of these is the inadequacy of the maps provided to elucidate the ranges cited in the text. The most complete map is that given in Fig. 5, opposite page 47, in which the type localities of all the subspecies are indicated by number. The numbers refer to the sequence of the check list on pages 194 to 196. The check list numbers are also given, but often out of sequence, in the main descriptive text, pages 47 to 148. Mr. N. Shoumatoff has pointed out to me that the discrepancies in sequence mainly result from the attempt to give the oldest name in any one group first in the text arrangement, whereas a purely systematic sequence is given in the check list. There are also, however, four errors in the numbering of the forms in the main text, as follows:

Number Given in Text	*Should Read*
69	68
70	69
67	70
68	67

Although the map is complete as to type localities, it omits a large proportion of the other localities cited in the text. These are frequently obscure; good maps of the region are not easy to obtain, and in consequence many of the localities must, even for the careful reader, remain meaningless. Maps purporting to give the ranges of the various subspecies are given in the section "Categories of Higher Order", pages 167 to 188, but the ranges are in fact indicated only by crudely drawn outlines, which are of little value for detailed analysis, and are in some cases misleading, *e.g.,* in the probably erroneous range attributed to the form *tancrei* in Fig. 16 and, by implication, in Fig. 13. In none of the maps is there any attempt to indicate relief, although the configuration of the mountain systems must have been well known to the authors and is of the greatest importance in the taxonomic situation.

The remaining weaknesses lie principally in the presentation of quantitative aspects of the data on which the study is based. The number of specimens examined is specified for only about two-thirds of the named forms; there is often no clear differentiation in the enumeration of specimens available for study at the time of writing and those examined earlier at the British Museum or those that were in Dr. Avinoff's collection prior to the Russian Revolution. Considerable weight is given to variation in genitalic and androconial characters among the various populations, but there is no indication of how many genitalic preparations were made, or of how the samples of androconia were taken or from how many specimens. There is no mention of the size of samples or of the statistical procedures used in deriving the average dimensions of the androconia and in assigning the androconia of the various populations to the six arbitrary categories that are used to characterize them. Beyond the statement that "the scales from any individual specimen vary very little and those from any individual population vary only slightly more" (p. 42), there is no effort to assess the extent of variation in androconial measurements within populations or to demonstrate the significance of such variation among populations. A similar vagueness is found in the descriptions of subspecies. Although this is partly offset by the numerous and excellent illustrations, it makes it hard in most cases to assess the variability of whole population-samples or to judge the reality of the discontinuities in variation between certain supposedly distinct populations. It is true that subjective assessments of variation and of discontinuity in variation are customary in taxonomic descriptions of Lepidoptera, but one would certainly have expected to see stronger and more explicit supporting data for such subtle and perhaps disputable distinctions as are proposed in, for instance, the *josephi-wilkinsi-intermedia* complex.

It is very probable that these faults, which are largely of omission rather than of commission, would to a considerable extent have been corrected by the authors had they been able to complete their work at greater leisure and under happier circumstances. I mention them simply to show how room is given for some of the skepticism that I shall express in following paragraphs, room that might have been greatly lessened by a more explicit presentation.

Turning now to the detailed consideration of the subspecies aggregations, we may consider first the *pamira,* or "specialized unbranded", division. Here we have a comparatively simple pattern of six subspecies, arranged in a north-south cline-like series, with a single short offshoot to the east in the central Pamir region. The authors treat this division as a simple polytypic species. No other interpretation seems possible.

Next in order of complexity is the *bolorica,* or "primitive branded", division. Here again we have a simple series of replacement-races, but the division occupies a larger territory and forms a more complex geographic and taxonomic pattern than does the *pamira* division. Avinoff and Sweadner recognize three species: *voigti* from the western Hindu Kush, *bolorica* from the central and eastern Hindu Kush, and *decolorata* extending from southwest Pamir along the northern slope of the Amu Darya basin. There appears to be a fairly definite taxonomic break between the *decolorata* and the *bolorica* groups. The forms of the bolorica group are smaller, duller, and sharper-winged than those of the *decolorata* group. They have more slender

androconia and stouter processes of the gnathos, and their valves lack terminal tubercles. These distinctions do not, however, appear to be absolute. The southern populations of the *decolorata* group show modifications in the direction of the slender androconium, the thorn-like gnathos, and the aborted terminal tubercle. Moreover, specimens referred on the basis of external appearance to *bolorica,* but apparently not structurally investigated, have been taken at Alitchur, in south Pamir, north of the Amu Darya Valley, which appears to form the main frontier between the *decolorata*-like and the *bolorica*-like forms. It seems at least possible that the genetic leakage which is apparently taking place here is across a geographical and not a biological barrier.

The southerly *voigti* complex (known from one female of the "subspecies" *voigti* and one pair of the "subspecies" *nigrocellata*) is *decolorata*-like in facies, and has, according to the description, a well-developed terminal tubercle; on the other hand the androconia are like those of *bolorica* and the gnathos may be taken as an extreme development of the *bolorica* type.

My inclination would be to include all the forms of the *bolorica* division in a single polytypic species, an arrangement not ruled out by Avinoff and Sweadner, although they did not adopt it. All the named forms are fully allopatric, and there is no conclusive, or even very strong presumptive, evidence of important sterility barriers within the division. That *bolorica* in this sense is specifically distinct from the southern members of the *josephi* division appears to be shown by the reported co-existence of the very distinct forms *grumi* and *darwasica* at Visharvi Pass.

A more difficult problem is presented by the members of the *huebneri,* or "specialized branded", division. This division has an arcuate range to the south of the main crests of the Hindu Kush and Karakoram ranges. On the basis of maculation, the subspecies can be divided into two principal groups: one characterized by a dark ground and bright, contrasting pattern, the other by a paler ground and pallid, ill-defined light pattern. The first group occupies the whole length of the Hindu Kush, and reappears in a narrow territory extending from the Deosai Plains along the southwest slopes of the Western Himalaya as far as northern Kangra in the Punjab. An isolated population of similar type occurs at Baltoro Mt. in the Karakoram. The second group extends from Astor and the northeast slopes of the Western Himalaya northeastward through the Zanskar and Ladak ranges to the Karakoram; the members of this group become progressively darker from east to west, so that the westernmost populations do not differ radically from the easternmost populations of the first group, which inhabit the opposite slopes of the Western Himalaya. An apparent exception results from the incursion of a tongue of the range of the pale northeastern subspecies *balti* between the ranges of the darker *astorica* and *expressa;* this is mentioned in the text, but is not shown in the distribution map on page 185. Thus a British Museum series referred to the pale *balti* is labelled as coming from the type locality - Deosai Plains - of the dark *modesta* of the western group. Avinoff and Sweadner conclude that the western and eastern groups of subspecies are specifically distinct. They state: "In any one locality (the members of the dark western group) are fairly easily separated from their lighter neighbours". Examination of the localities listed shows, however, that the only ones in which specimens of both groups have been taken are the Deosai

Plains and Rohtang Pass, at the north and south ends, respectively, of the crest of the Western Himalaya. The situation at Rohtang Pass is poorly understood, owing to the possible mislabelling of some of the specimens. No direct evidence is given that the two forms from the Deosai Plains actually fly together; I do not have enough geographical information on the locality to judge whether or not the two series may have come from separate colonies, from eastern or western slopes, or from different altitudes. There is indeed, characteristically, no indication of how large the two Deosai Plain series are, or of how sharp and how constant are the differences between them. To provide supporting evidence for the differences between western and eastern groups the authors state, without elaboration, that the variation of the pooled populations is distributed bimodally. This condition may well be the consequence of physical separation by the barrier of the Western Himalaya, and not the result of physiological separation by a partial or complete reproductive isolation.

At the southern end of the Western Himalaya, in the Rohtang Pass, an additional form lacking androconia has been taken. This is supposed to co-exist with dark and with light androconia-bearing forms. The situation is complicated by the possible mislabelling of some of the material. It may be, as Avinoff and Sweadner suppose, that the form without androconia *(rohtanga)* is a good species, but I think it more likely that it is an extreme variant, perhaps representing a semi-isolated population on the west side of the pass. I think it very unlikely that the two androconia-bearing forms are specifically distinct. When it is remembered that the whole of the material from Rohtang Pass consists of fourteen specimens, of which two are considered to be definitely and four to be possibly mislabelled, the difficulty of assessing the true situation becomes obvious.

A second form with androconia occurs in the general vicinity of Astor, to the north of the Punjab Himalaya. This form differs also in wing shape and in four apparently independent characters of maculation from the sympatric androconia-bearing forms. Although it is not the only tenable hypothesis, I think it at least fairly likely that this form *(cadesia)* is a distinct species. The remaining forms of the *huebneri* division I should be inclined to consider as subspecies or variants of a single species, although certain doubtful points remain to be cleared up before this view can be accepted with absolute confidence.

A somewhat similar but perhaps less difficult problem is presented by the *regeli,* or "fuscous-and-ivory", division. This has the most northerly range of the divisions of the genus, extending from the Alai Mts. north to the Alexander Mts. and eastward into the Tian Shan and Boro Khoro ranges. Avinoff and Sweadner would recognize three species in this division. They separate these on characters which appear to me, on the basis of the figures and illustrations given, to be completely intangible. There are three supposed areas of overlap of the "species". In the general region of the Alexander Mts. four subspecies are shown on the distributional maps (pp. 178-181) as occurring. Of these, *tancrei* and *latifasciata* are stated in the text to be of doubtful provenance; *kirgizorum* is not only of doubtful origin but is referred in the text to another division. This leaves a single subspecies, *kasakstana,* as an undisputed inhabitant of the region. Farther to the south, *occidentalis,* listed as a subspecies of *latifasciata,* occurs at Naryn, to the west of the

range of typical *latifasciata* and in the range of typical *abramovi. Occidentalis,* however, is based on a single specimen, a dwarfed and suffused individual that looks to my eye much more different from *latifasciata* than that form does from *abramovi.* It is my opinion that *occidentalis* probably represents an individual variant or a high-altitude from of *abramovi,* and that it has no especially close relationship to *latifasciata.* The third supposed zone of overlap is in the southern part of the range of the division, in the neighborhood of the Tchatyr-Kul. Here four forms are listed as occurring, of which one is referred to the "species" *abramovi* and three to *regula.* An examination of the figures given, however, particularly Figs. 15 to 19 and Fig. 28 of Plate 10, suggests strongly that only a single variable population exists in this district. The report by Erschoff, cited on p. 109, of two forms (presumably *regeli comradti* and *abramovi abramovi)* flying together without intermediates is so vague that it is probably fair to minimize its significance.

Apart from these extremely doubtful instances of overlapping, the various members of the fuscous-and-ivory division form a very neat group of replacement-races. If the illustrations of the various subspecies are examined in geographical sequence with this interpretation in mind, they seem to form a smoothly graded series, and I accordingly believe that they would best be treated as components of a single species.

The last major group recognized by Avinoff and Sweadner is the *josephi,* or "russet unbranded", division. This ranges from the Alexander Mts. south to the northern side of the Amu Darya Valley in the west and to the northern Karakoram in the east. It is thus at least partly sympatric with each of the four other divisions. From the *pamira* and *huebneri* divisions it is distinguished by clear morphological characters. From the *regeli* division it has no major structural differences, but differs very widely in maculation in localities where the two fly together, as is well shown in Plate 8. The figures on this plate, by the way, represent a taxonomic and not a geographical "ring": the superficially most similar forms of the two divisions live farthest apart, instead of in adjacent territories as might be inferred from the arrangement; in order to show the geographic relationship, the figures in the left-hand column should proceed upward and not downward from Fig. 1. Finally, from the *bolorica* division the *josephi* division differs in that its members lack androconia. It is true that the androconia are weak in the subspecies *roborowskyi* of the *bolorica* division and that the genitalic differences between the contiguous populations of the two divisions are by no means striking. However, as I have mentioned, the two divisions appear to co-exist, without mingling, at Visharvi Pass.

Avinoff and Sweadner consider that the *josephi* division is composed of "an irreducible minimum of three" species. I regret that after careful examination of the figures and descriptions I find it very hard to accept this conclusion. It seems to me most unlikely that in the second column of Plate 8, representing the so-called "ring" already mentioned, Figs. 8, 10, and 12 are of one species, Figs. 9, 11, and 13 are of a second, and Fig. 14 is of a third. Avinoff and Sweadner adopt their interpretation chiefly because of the occurrence of three supposedly distinct forms in certain regions of the Alai and Transalai ranges, notably at Taldyk Pass, although it is freely admitted that the same forms intergrade at other places. Space does not allow me to review the various populations in detail, but an account of the general dis-

tribution pattern seems desirable. In the south, from the northern Karakoram to the Transalai, is found a series of small, dull, pallid forms in the high-altitude passes. On the lower ground to the west, and less markedly at moderate altitudes in the east, these forms intergrade with or are replaced by larger, more brilliant, fulvous-marked forms. These, together with certain individuals of the second type from the Transalai and Alai, are grouped by Avinoff and Sweadner as the "species" *leechi.* A second group of fulvous forms in the northwestern Pamir and the Transalai and Alai is grouped with a number of subspecies from the ranges north of the Syr Darya under the name *josephi.* I am unable to appreciate the differences between the *josephi* and the *leechi* forms in the western Alai and Transalai, and I believe that they in fact constitute a single interbreeding population or geographical group of populations. In the eastern Alai and Transalai the paler forms *wilkinsi* and *robusta* are found. I think that these are pale subspecies replacing the darker western complex and that the supposed zone of overlap at Taldyk Pass is simply a blend zone of the eastern and western races. Avinoff and Sweadner, however, also include in the "species" *wilkinsi* three subspecies from mountain ranges well to the north across the very wide basin of the Syr Daria. In my opinion these races have been artificially torn out of the series of northern races that Avinoff and Sweadner refer to *josephi,* of which they seem to me to form an integral part. To recapitulate, I believe that the members of the *josephi* division can best be treated as subspecies of a single species: a series of small alpine subspecies *(e.g., leechi)* in the south, intergrading on the west to a second series of bright, large subspecies *(e.g., darvasica, intermedia),* which extends northward through the western Alai and across the Syr Daria to the northwest Tian Shan, giving off a lateral series of pale populations *(wilkinsi, robusta)* in the eastern Alai and Transalai.

In short, I think there are excellent reasons for reducing Avinoff and Sweadner's "minimum" number of twenty species given in the check list to seven and possibly to five. When this is done, what happens? The baffling problems of evident gene-interchange across species lines disappear; they existed only because the lines did not demarcate species in the biological sense. On the other hand, there is little if any evidence of gene-interchange between divisions, and in general the divisions appear to me to represent the natural species of this group.

Avinoff and Sweadner would undoubtedly have argued that this is a superficial view, that there are discontinuities and overlaps within the divisions too great to be accommodated within the limits of a single species. I believe, however, that many of the apparent discontinuities are the result of faulty sampling - obviously hardly to be avoided when the nature and limited quantity of the material are considered; other discontinuities, believed by Avinoff and Sweadner to be determined by reproductive behaviour, are in my opinion probably the result of simple geographic, environmental, or genetic factors. The struggle to characterize the elusive and inconstant differences of *"wilkinsi"*, *"leechi"*, *"intermedia"*, and *"josephi"* seem to me to be typical of the sort of difficulty one often encounters in the initial stages of investigation of a species problem, when one is grappling with what eventually prove to be imaginary, or at least intraspecific, differences.

I have dwelt at length on the apparent weaknesses of the taxonomic treatment because, although this treatment is fundamental to those aspects of

the paper which will interest the general student, it will not be readily accessible to criticism by the non-lepidopterist. The recognition of these weaknesses should not, however, be permitted to obscure appreciation of the many admirable features of the book, of which I have tried to give some indication in the first part of this review. Taking the over-all view, I do not hesitate to say that this is a most valuable work, magnificently produced, and representing an intensive, conscientious, and in most respects very accurate study of a group of great intrinsic interest. It is a book that I am glad to have on my shelf, one written by distinguished entomologists whom I am proud to have numbered among my friends.

Acknowledgement

I wish to thank Mr. Nicholas Shoumatoff, New York, for carefully reading a preliminary manuscript of this review, and for making a number of constructive suggestions. I do not wish to imply, however, that Mr. Shoumatoff necessarily subscribes to the statements or criticisms made herein; for these I take full responsibility.

This is Contribution No. 2971, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada. The author is Agricultural Research Officer.

Division of Entomology, Ottawa, CANADA

PERSONALIA

The death of Dr. ROBERT LOELIGER was recently reported here (*Lepid. News* 6: p. 78). The continuation of the Circulaire of the *Centre d'Observation pour les Migrations de Papillons,* which he founded and maintained, has been undertaken by two members of the Groupe. These new editors are EUGÈNE PLEISCH, Regensberstr. 30, Zurich 50, and HANS SIDLER, Goldregenweg 21, Zurich 50, Switzerland, Dr. LOELIGER'S final *Circulaire* was No. 38. No. 39/40, by Mm. PLEISCH and SIDLER, is dated August 1952. In it are reported 1952 migrations through North Africa and Europe of *Vanesssa cardui, Celerio livornica,* and other Lepidoptera. An interesting observation by ANTHONY VALLETTA, of Malta, concerns two *Danaus chrysippus* which had apparently arrived from Africa with the *V. cardui; D. chrysippus* had not been seen on Malta since 1943.

CYRIL F. DOS PASSOS has been appointed a Research Associate in the Section of Insects and Spiders of the Carnegie Museum, in Pittsburgh, Pennsylvania. For many years Mr. DOS PASSOS has been a Research Associate of the American Museum of Natural History, in New York. The Carnegie Museum has a long tradition of developing notable collections of Lepidoptera (see Sweadner, *Lepid. News* 2: p. 80; 1948). HARRY K. CLENCH is now the lepidopterist on the Museum staff.

The editorship of *The Entomologist,* the well-known British monthly periodical, has passed from Mr. N. D. RILEY to Mr. D. LESTON. Mr. RILEY, Keeper of the Department of Entomology in the British Museum of Natural History, is responsible for the largest and both taxonomically and geographically most complete research collections of insects in the world. At present he is President of the Royal Entomological Society of London. In addition to these and other positions of responsibility, as well as his notable researches on the Lepidoptera, Mr. RILEY has been for many years a most effective Editor of *The Entomologist.* He remains as an assistant editor.

OBITUARIES

GEORGE TALBOT (1882-1952)

On 13 April 1952, GEORGE TALBOT died in England after several months of illness. He was born in October 1882. N. D. RILEY (*Entomologist,* vol. 85: pp. 191-192) reports that TALBOT was employed in curatorial capacities successively by HERBERT ADAMS, a wealthy amateur Rhopalocera collector, the well known dealer, W. F. H. ROSENBERG, and J. J. JOICEY, a famous and wealthy amateur lepidopterist with whom TALBOT collaborated in publishing several papers. During the first World War TALBOT worked with ARTHUR BACOT at the Lister Institute on the transmission of trench fever and typhus by lice. After working at the British Museum and Oxford following JOICEY'S death TALBOT finally took a position during the second World War with the British Pest Infestation division.

Captain RILEY notes: "Talbot . suffered many vicissitudes. Handicapped, too, by a defect in the sight of one eye, and with none of the initial advantages given to most entomologists, he yet won for himself a position of eminence and respect in his own sphere . . "

TALBOT published about 150 papers, nearly all on Rhopalocera and several of them very substantial generic revisions. Some of his best known works were in JOICEY'S *Bulletin of the Hill Museum.* His *Monograph of Delias* is a major work, and he also revised several smaller genera of Pieridae and certain other families. Long specializing on the pierids, it was natural that TALBOT should write the three Pieridae parts of the *Lepidopterorum Catalogus,* published by W. Junk in the early 1930's. His largest publication was the revision in two volumes of the *Butterflies* in the series on the Fauna of British India.

C. L. REMINGTON, Yale University, New Haven, Conn., U. S. A.

CORNELIS DOETS (1894 - 1952)

On 15 June 1952, died CORNELIS DOETS, 58, the eminent Dutch microlepidopterist, in Hilversum, Holland. DOETS was a musician by profession, and studied Lepidoptera in his spare time. Notwithstanding, due to his extraordinary energy and enthusiasm, in a few years he became an authority on the Dutch "micros", brought together an excellent collection, reared thousands of specimens, and recorded many new species for the Dutch fauna.

Although DOETS did not publish much, through lack of spare time, he cherished great plans for the future: he prepared the compilation of a new hand book on Dutch Microlepidoptera, that would have been illustrated with photographs, and with drawings of the genitalia of every species. Alas, he was not enabled to carry out this most needed work. His decease is a great loss to the Nederlandsche Entomolgische Vereeniging, and to his numerous friends.

Plans are being made to divide DOETS' important collection between the Zoological Museum of Amsterdam, where the Macrolepidoptera will be deposited, and the Museum of Leiden, that will receive the Microlepidoptera.

A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, NETHERLANDS

REVIEWS

BUTTERFLIES OF RHODESIA. By E. C. G. Phinhey. Published by the Rhodesia Scientific Association and printed at the Herald Office, Salisbury. IV + 208 pp., 13 text-figures, and 21 plates, 13 colored. April, 1949.

Through the courtesy of Captain R. H. R. STEVENSON of Selukwe, South Rhodesia, the reviewer received a copy of this attractive and informative book.

In a foreword, Sir JOHN KENNEDY, K. B. E., C. B., Governor of South Rhodesia, lists some of the previous works on the African Butterflies and outlines some features of the present work. The introductory chapter deals briefly with elementary matters regarding butterflies' external structures, something on senses, plan of the life cycle, variation, protective coloration and migration. This is followed by directions for collecting and preserving butterflies, how to make wing-scale transfers to paper, breeding, and a final section on "Man and the Insect World." This latter might have been appended to suggest that a study of butterflies could have a relationship to insects of economic interest.

A third chapter deals with information on butterfly taxonomy with special reference to the Rhodesian species treated in the book. The first sentence deplores the fact that the majority of species considered are not well-known by common names, but this deficiency is remedied in the text where we find the English touch in designations like the Pied Zulu, Woolly Legs, Red Playboy, Erikson's Highflyer, Bush Scarlet, Black Heart, White Pie, Grass Jewel, Two Pip Policeman, Garden Inspector, Air Commodore, Pirate, and the Common Joker, to name a few.

A key to families includes characteristics of adults, larvae, and pupae. The major portion of the book, 117 pages, is devoted to a systematic treatement of the species, each of which is discussed as to description of adult, pupa, and habits and distribution.

One of the most useful charts included is entitled "Time Table for the Species Described" which lists the Latin name of each species, common name, food of larva, seasonal occurrence (early or late Spring, Summer, Autumn and Winter), and locality and abundance. It might be noted that in South Rhodesia, Spring is from September to November, Summer is from December to February, Autumn extends from March to May, and Winter is from June to August. Seven and a half pages are devoted to foodplants of caterpillars with Latin and common names, plant family, and larvae which feed upon these. This is followed by a checklist of the more than 400 species of butterflies in the region. Glossary, Author's Names, References, a short list of dealers in entomological supplies, and Index to Butterflies completes the book.

The color plates are for the most part beautifully executed and are made from paintings by the author. Altogether, about one-third of the known butterflies of the area are illustrated either in color or in gravure.

Many people who still regard the Dark Continent as swarming with wild beasts, and who shudder at the supposed hair-raising adventures of artillery-equipped expeditions will be quite astonished to discover through this book that the butterflies of Rhodesia are better known than they are over large parts of North America.

The book is highly recommended to anyone interested in the butterflies of Africa.

RALPH W. MACY, Department of Biology, Reed College, Portland, Oregon, U. S. A.

DIE SCHMETTERLINGE MITTELEUROPAS. By Walter Forster & Theodor A. Wohlfahrt. [In German.] [Second instalments], vol. 1: pp. 33-64, figs. 19-36; vol. 2: pp. 33-64, pls. 5-8, figs. 14-22. Stuttgart, 1952. Publisher: Franckh'sche Verlagshandlung, W. Keller & Co., Stuttgart, Germany. Price DM. 10.

The first instalments of this work were reviewed in the *Lepid.* NEWS (vol. 6: nos. 4-5, pp. 79-80; 1952).

The second part of vol. 1 of this useful work discusses the preparation of the pupae and the imagoes, the arrangement and conservation of a collection as to labeling, determination, preservation, shipment, exchange and purchase, and the keeping of a diary. Also commences a discussion of the structure of butterflies, the study of their development, and the principal features of bodily structures, all of which are carefully explained and well-illustrated in the eighteen figures.

The second part of vol. 2 concludes *Erebia,* and then treats of the following genera: *Agapetes, Oeneis, Hipparchia, Arethusana, Brintesia, Chazara, Satyrus, Minois, Aphantopus, Pararge, Dira, Lopinga, Maniola, Hyponephele, Pyronia, Coenonympha,* thus concluding the Satyridae, and commences the Nymphalidae with the following genera: *Apatura, Limenitis, Neptis, Vanessa, Aglais, Inachis, Nymphalis, Polygonia, Araschnia, Euphydryas* and part of *Melitaea.* Again the beautiful plates lag behind the text, completing as they do the Pieridae and running through the Satyridae to almost the end of *Erebia.*

The second instalments of *Die Schmetterlinge Mitteleuropas* are fully the equal of the first, and will have a wide appeal to those desirous of determining their European butterflies. From the American point of view the genera appear to have been considerably split, but, in the reviewer's opinion that is preferable to too much lumping. Also, it is customary in Europe.

This work, when completed, will supersede largely other similar works now in use, such as Lang's *Rhopalocera Europae Descripta et Delineata* (1884), and Spuler's *Die Schmetterlinge Europas* [1901]-1910, and will make an interesting and up to date complement to Verity's *Le Farfalle Diurne d'Italia* (1940-).

C. F. DOS PASSOS, Washington Corners, Mendham, New Jersey, U. S. A.

A NEW SPECIES OF STRYMON *HUEBNER FROM GEORGIA (LEPIDOPTERA, LYCAENIDAE).* By Alexander B. Klots & Harry K. Clench. *American Museum Novitates,* no. 1600: 19 pp., 3 figs. 11 Dec. 1952. Available from: American Museum of Natural History, New York 24, N. Y., U. S. A., $0.25.

Occasionally a small paper seems to us so singularly fine that we must give it special attention for readers of the *Lepid. News.* This new one by Klots and Clench is a model of perfection as the description of a new species. *Strymon kingi* is not a commonplace new species, but one of those especially interesting "sibling species" which have been discovered recently (*e. g., Colias australis* in Belgium, *Mitoura hesseli* in New Jersey, and *Strymon caryaevorus* in Canada). *S. kingi* is a close relative of *S. liparops,* and the two species were taken together at Savannah, Georgia, the type locality of *S. kingi.* In view of the special significance of foodplant differences with other sibling species of Lepidoptera, the discovery of the foodplant of *S. kingi* will be of great interest. Perhaps one of the careful collectors of the new species will soon find the favored plant.

Technically the authors have produced a masterly characterization, with elaborate descriptions of the details of structure, pattern, and color of the type specimens and their ♂ and ♀ genitalia. Careful comparisons are made with the related species of *Strymon.* But I predict that the descriptive words will be by-passed by most later workers, since the paper includes beautiful side-by-side drawings of the ♂ and ♀ genitalia of *S. kingi, S. liparops,* and *S. falacer,* as well as fine photographs of the wing patterns of all three species.

C. L. REMINGTON, Yale University, New Haven 11, Conn., U. S. A.

FIELD AND TECHNIQUE NOTES

SPARROWS FEEDING ON CONGREGATING *PAPILIO*

During the last week of June, 1952, *Papilio glaucus canadensis* R. & J. (the Tiger Swallowtail) was the most conspicuous and apparently the commonest species of butterflies in the vicinity of Fairbanks, Alaska. The species was seen assembling in very large numbers at damp spots on bare ground, both on the banks of streams and on cleared land. All specimens taken during this period proved to be males; females, if present at all, apparently did not join the "mud puddle clubs".

On two occasions (at Ester, a few miles west of Fairbanks, and on the Steese Highway in the Chatanika Valley) sparrows were observed hopping about among these aggregations and pecking at individual swallowtails. Unless actually attacked, the insects appeared to pay no attention to the birds. The latter were not actually seen to eat the butterflies, though on several occasions swallowtails were caught and escaped. It is quite possible that the sparrows were disturbed by our presence, or perhaps they were satiated by the easy pickings; evidence of actual predation was easily seen in the large numbers of detached wings scattered around the assembling places. The predator was, in one case, a White Crowned Sparrow (*Zonotrichia leucophrys*), but it is quite likely that other species such as the Tree Sparrow (*Spizella arborea*) and Slate-colored Junco *(Junco hiemalis)*, both of which were common in the neighborhood, have similar habits.

We think this observation worthy of record, since no similar case of predation has come to our attention in connection with the well-known assemblages of *Papilio marcellus, Colias, Phoebis, Eurema, Limenitis arthemis,* etc., in the United States. Nor have we seen any published record of this sort. Any further observations of a similar nature will be of great interest.

G. W. RAWSON, CIBA, Summit, New Jersey, U. S. A., and
P. F. BELLINGER, University College of West Indes, Mona, St. Andrew, JAMAICA

A NEW METHOD FOR STORING PAPERED LEPIDOPTERA

The problem of relaxing papered Lepidoptera has been one of concern to the author for some years. In those cases where material is collected in large quantities at a time, there has seemed no alternative but to paper and dry the majority of the specimens and to hope to relax them in the winter slack season. However, it has been my experience that there is a considerable loss due to staining or fading during relaxing and to breakage when the relaxed specimens are being mounted. The Lycaenidae and Pieridae have been particularly difficult to deal with in these respects.

It would now appear, however, that there is a method infinitely superior to papering dry for preserving those specimens which cannot be mounted at once but are ultimately to be a part of the collector's own series. This method is freezing. Those collectors who have access to a deep freeze or who can steal a bit of space in the freezing compartment of the family refrigerator will find that frozen specimens keep perfectly for months and need only be thawed out to be ready for mounting.

To prepare specimens for freezing it is only necessary to put them into papers or envelopes (marked with the place and date of capture, etc.), seal the envelopes into water-proof boxes or packets, and place them in the freezing unit. At subzero temperatures they will last indefinitely. It should be emphasized that the specimens must be kept in moisture-proof containers. This precaution not only prevents damage when the wife defrosts the refrigerator, but it also prevents the specimens from drying out. They will dry out even while frozen as anyone who has stored improperly wrapped meat in a freezer knows.

At first glance it would appear that the system might be useful only for those specimens intended for the collector's own cabinets, but experience has shown that frozen specimens in tight tin boxes may be shipped over the whole country by airmail and arrive in mountable condition; thawed of course, but still pliable. A drop of dilute carbolic acid or other mold-preventative on a bit of cotton in the box will discourage the development of mold during the period in the mails. In view of the present rapid air service to the continent of Europe and to England it should also be possible to ship valued specimens abroad by this method.

JOHN P. KNUDSEN, Oglethorpe University, Georgia, U. S. A.

SAMPLING MICHIGAN LEPIDOPTERA BY THE FIXED LIGHT TRAP

The Edwin S. George Reserve is a tract of about 1600 acres in Livingston County, Michigan, donated to the University of Michigan by the late EDWIN S. GEORGE. It is what would be described as sub-marginal farm land, consisting of open fields, marsh, ponds, coppice, and hills, forested with the oak-elm-maple complex. A few junipers are the only conifers. It is used as a biological study area by faculty, students, and other research workers.

One of the research projects is a study of the insect fauna. Under the care of a resident curator, two or three light traps are operated during the season. These consist of a cyanide jar, an electric light, and an electric fan, which blows the attracted insects into the cyanide jar. In the morning, the catch is sorted into various groups and these are ultimately delivered to those studying the various groups.

During the past few years it has been the privilege of the writer to examine the microlepidoptera thus collected, and the results give a very good indication of the advantages and disadvantages of this method of collecting. As a means of studying the distribution of species it appears to be better than any one other method. Of the one thousand-odd micros recorded from Michigan, nearly 600 have been taken in Livingston County. There are species more usually expected from the south, the west, northwest, east and north; a number have previously been known only from the type material. It is useful in determining the relative abundance, although some come to the light only sparingly and some not at all. There are of course only negative indications of food plants. Five specimens of *Omphalicera cariosa* Led., recorded as feeding in fruits of pawpaw, were taken, although the curator informs me that that plant does not occur on the Reserve. *Tortrix packardiana* Fern., feeding on fir, *Zenodochium citricolella* Cham., feeding in mummied oranges, and *Choristoneura fumiferana* Clem., the Spruce Budworm, were far from appreciable quantities of their recorded foodplants.

One of the most serious disadvantages of this method of collecting is the damage to specimens by the rapidly revolving fan and by larger Coleoptera. Less than half are of acceptable museum quality. Many can be determined only by wing and genitalic dissection. If any one is interested mainly in distribution rather than in making a sightly collection, these disadvantages are not such a major problem. Supplemented by the usual field work and such rearing as may be practicable, a few years should give an excellent approximation of the limits of the insect fauna.

RALPH BEEBE, 4169 Tenth St., Ecorse, Mich., U.S.A.

MIGRATION OF THE MONARCH BUTTERFLY THROUGH CHICAGO

On September 16, 1952, there was evidence of a migration of Monarch Butterflies (*Danaus plexippus* L.) through the city of Chicago. The weather was clear, with a moderate northwest wind and the maximum temperature reaching 80° F. During about 2 hours before sunset, 169 individuals were counted from the windows of an apartment. The location was about 2 miles west of "The Loop," well within the city, proper. The insects were flying westward at a leisurely rate; none were seen to alight. The migration was intermittent, several butterflies passing within a few seconds, then none being seen for 2 or 3 minutes. Only rarely did a butterfly pass in the opposite (eastward) direction, and such as did were seen to turn shortly and fly west with the others. With the monarchs was a smaller number of *Colias eurytheme* Bdv. As the sun sank in the west the butterflies flew higher in the air along the street. About half an hour before sunset it was discovered that many were migrating over the rooftops of the 3 and 4 story buildings that line the block. These were travelling in a southwesterly direction rather than west along the street like the earlier specimens. This may have been a response to light, as the street itself was by this time rather in the shade. Occasional stragglers were seen passing as late as the time of sunset. This apparent migration followed several days during which Monarchs were more numerous than usual, but not present in such numbers as were observed on this evening. A few were seen the following morning, but not again in such numbers.

MACDONALD FULTON, Loyola University School of Medicine, Chicago, Ill., U. S. A.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [Y.O.] - Y. OKADA; [C.R.] - C.L. REMINGTON; [J.R.] - J.E. REMINGTON; [T.S.] - T. SHIRÔZU. **A complete set of these pages for clipping and filing may be obtained for Vols. 4, 5, 6, and 7 for $0.50 per volume.**

E. DISTRIBUTION AND PHENOLOGY

Box, Harold E., "The geographical and ecological distribution of some neotropical species of *Diatraea* Guild. (Lep., Pyral.) and certain of their parasites." *Proc. VIII Int. Congr.*, pp. 351-357. 1950. Discusses food plants and distribution of 9 spp. and some dipterous parasites. Evidence that both hosts and parasites differentiate into biological races in different parts of their ranges. [P.B.]

Hellman, E. A., "Observations on the lepidopterous fauna of Paltamo Parish (Kn) in the summer of 1949" [in Finnish, English summary]. *Ann. Ent. Fennici,* vol. 15: pp. 121-123. 5 Dec. 1949. 39 new records. Discussioin of causes of scarcity of Lepidoptera; notes on the biology of *Pieris napi.* [P.B.]

Hoffman, Emil, "Sammelergebnis aus Warscheneckgebiet im Totengebirge aus dem Jahre 1944" [in German]. *Z. Wiener Ent. Ges.*; vol. 57: pp. 38-42. 30 June 1947. Annotated list (Macrolepidoptera).

Komárek, Oldřich, "La contribution à la connaissance de la faune lépidoptèrologique de la Bohême du nord-est, avec les diagnoses de deux formes nouvelles" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 41-45, 1 fig. 1 Feb. 1950. New records for the area and new localities. Names 2 aberrations. [P.B]

de Lesse, H., "Observations sur l'époque d'apparition et le comportement des Lépidoptères du Groënland occidental et remarques sur leur homochromie" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 163-169, 1 pl. "Nov.-Dec. 1949" [26 Apr. 1950]: Phenological information on the spp. observed on the French expedition to west Greenland in 1949. Figures 15 spp. to illustrate their dull coloration, which blends with the rocks. [P.B.]

Picard, J., "Nouvelles notes sur *Pyrgus* (*Pyrgus*) *malvae* Lin." [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 241-245. "Mar.-Apr." [25 Sept.] 1950. Notes on genitalia, biology, distribution [P.B.]

de Puységur, K., "L'existence de *Libythea celtis* Fuessly dans les Alpes-Maritimes est connue depuis plus 75 ans" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp.81-83. "Mar.-Apr. [4 Oct.] 1949."

Warnecke, Georg, "Weitere Ausbreitung des Landkärtchens (*Araschnia levana* L.)" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holst.,* n.s., vol. 3: pp. 14-15. 1950.

F. BIOLOGY AND IMMATURE STAGES

Box, Harold E., "The more important insect pests of sugar cane in northern Venezuela." *Proc. Hawaiian Ent. Soc.,* vol. 14: pp. 41-51, 2 maps. Mar. 1950. Distribution and biology of *Castnia licoides* and 4 spp. of *Diatraea.* [P.B.]

Diakonoff, A., "Viviparie bij Lepidoptera" [In Dutch: Viviparity in L.] *Verslag 83e Wintervergadering Nederl. Entom. Vereeniging*: pp. XXIX - XXXIII. 1 Feb. 1952. A preliminary report of studies on viviparity in *Monopis* (Tineidae). [A.D.]

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NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Notices will continue to appear until forced out by newer ones. We cannot guarantee any notices but expect all to be *bona fide.* Please notify us of any abuse of this service.

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Wish to obtain complete run of *Notes on Moths and Butterflies* (formerly *The Howell Mountain Butterfly Club),* edited by Mrs. Evelyn Gilstrap Williams. C. F. dos Passos, Washington Corners, Mendham, N. J., U. S. A.

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ZOOLOGICAL NOMENCLATURE

Meetings of the International Commission on Zoological Nomenclature will be held in Copenhagen, Denmark, during the meeting of the Fourteenth International Congress of Zoology from 5-12 August 1953. FRANCES HEMMING, Secretary of the Commission, has announced the holding of a "Colloquium on Zoological Nomenclature" from 29 July to 4 August, immediately prior to the opening of the Congress. The proposed agenda of the Colloquium includes preliminary consideration (1) of the draft of the revised International Code, recently completed by jurists, and (2) of questions relating to amendments to the Code submitted since the revision in 1948. Attendance at the Colloquium will be by invitation, with as thorough representation as possible from different parts of the world and from specialists in all possible parts of the Animal Kingdom. The draft text of the International Code will be published in the *Bulletin of Zoological Nomenclature* before the Colloquium opens. Lepidopterists interested in attending these sessions should communicate immediately with Secretary HEMMING (28 Park Village East, Regent's Park, London, N. W. 1, ENGLAND.)

C. L. REMINGTON

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Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

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(complete contents on back cover)

29 July 1953

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Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.*, mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.*, personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

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THE LEPIDOPTERISTS' NEWS

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NOTES ON THE LIFE HISTORY OF *INCISALIA AUGUSTINUS* AND A NEW HOST PLANT RECORD (LYCAENIDAE)

by J. B. ZIEGLER

The host plants of *Incisalia augustinus* Westwood have been stated to be *Vaccinium vacillans* Solander and *Kalmia angustifolia* L. by DAVENPORT & DETHIER (1938) and KLOTS (1951). These records appear to be based upon papers by JOHN H. COOK (1904, 1906, 1907a), part of an excellent series on the biology and taxonomy of the genus *Incisalia* Scudder which appeared just after the turn of the century and which clarified many points of confusion which had existed with regard to this group of butterflies. *Vaccinium* spp. are well established as host plants of *I. augustinus* in the vicinity of Albany, New York, on the basis of COOK'S work, since he was apparently able to observe the female ovipositing on them in nature (1906), definitely found larvae in advanced stages feeding on them in nature (1904), and was entirely successful in rearing the insect through all of its transformations on them in the laboratory (1906). However, the status of *K. angustifolia* as a host plant seems much less certain. Although COOK was not entirely clear on this point, it is likely that his description (1906) of the site of oviposition on *Kalmia* was based on laboratory observations alone. More conclusively, he states definitely that he was never able to discover the larva on this plant in nature, and further, that he found it impossible to rear the insect on *Kalmia* in the laboratory (1906). Significantly, he also stated (1906) that larvae which had been feeding on *Vaccinium* refused to eat *Kalmia*. In addition, he himself pointed out (1906) that the larvae, normally green in color, would be rendered quite conspicuous while feeding on the rosy *Kalmia* flowers, the most likely site of attack. These considerations make it seem most unlikely that *Kalmia* is an actual host plant of *I. augustinus* in nature, and it should probably be removed from the host plant list of this butterfly, at least until such time as more conclusive evidence can be brought forward.

However, it now appears that this gap can be filled by the inclusion of a third plant. In collaboration with Dr. G. W. RAWSON, the author has been attempting to work out in detail the life history of *Incisalia polios* Cook & Watson, which is only very imperfectly known. As part of this project, a number of eggs were taken by the author in the spring of 1951 at Lakehurst, New Jersey, on Bearberry, *Arctostaphylos uva-ursi* Spreng., the known (Cook, 1907c) host plant of *I. polios.* The first was found on April 28 and a few others on May 5. Of these, the one taken on April 28 and one of those taken on May 5 were brought through on Bearberry to the adult stage, which emerged from the pupae at about the same time in the spring of 1952. In the confident expectation that both would prove to be *I. polios,* the two had been placed together and were in the same breeding cage at the

time of emergence. It was a great surprise to observe, therefore, that while one was indeed *I. polios,* the other was an undoubted specimen of *I. augustinus*! This observation, therefore, constitutes excellent evidence that *A. uva-ursi* is a natural host plant of *I. augustinus* in southern New Jersey.

Although a detailed set of notes was kept for each of the larvae, the unfortunate circumstance that segregation of the two was not maintained makes it impossible to refer either set of notes to the appropriate species with any degree of certainty. However, the major differences observed will be noted briefly, with the thought that they may be of interest to others who might rear either of these species. The first instar larva which emerged from the egg on May 7 possessed a rather large, dark brown spot on the dorsum in the anal region. This spot was not seen on the first instar larva which emerged on April 30. It may be noted that this spot was not mentioned by COOK (1907a) in his description of the first instar larva of *I. augustinus.* Late in the first instar, the April 30 larva had a dull, lemon-yellow ground color and was marked with a dorsal pair of closely set, dull reddish stripes and similar pairs of lateral stripes. Late in the first instar, the May 7 larva had similar ground color and stripes, except that the latter were of a bright rose color. The space between the lateral rows of stripes was partly occupied by indistinct, rosy shadings. Thus, the May 7 larva had, at this point, a considerably redder appearance. The dorsal, anal spot previously mentioned was still in evidence but was much reduced in size. The rosy markings of the May 7 larva persisted throughout the second instar and, on the posterior part of the body, throughout the third instar. This larva did not become completely green until the fourth instar. On the other hand, the corresponding (but originally dull reddish) markings of the April 30 larva had become a dull, olive green in color by the middle of the second instar. In this connection it is of interest to note that COOK (1907b) comments in a footnote to a paper on *I. henrici* that "The dorsum is red in *I. polios* during the second larval instar, —".

The pupa derived from the April 30 larva was somewhat larger than that from the May 7 larva, was lighter brown in color and had shorter hairs. COOK (1904) described the pupa of *I. augustinus* as being "sparsely clothed with short hairs".

The comparative notes given above, although admittedly very sketchy, engender the suspicion that the April 30 larva was *I. augustinus* and that the May 7 larva was *I. polios.* This supposition would be supported by the earlier flight period of *I. augustinus* in the New Jersey pine barrens.

In addition to these differences between the two individuals studied, certain similarities were noted. These similarities will be discussed in comparison with earlier observations made by COOK, in connection with *I. augustinus.*

First, the number of larval molts may be mentioned. COOK (1906) was able to detect only two in the case of two individuals after painstaking observation, although he states that this was quite unexpected since *I. irus, I. henrici,* and *I. niphon* molt three times. The total times in the larval stage for the two individuals studied by COOK were twenty-nine and twenty-three days. Although the observations upon which the present paper are based were perhaps not as detailed in this regard as were COOK'S, yet

definite evidence was obtained in both instances for the usual number of three molts. In the case of the egg hatching on April 30, the duration of each of the first three larval instars was four days, that of the fourth was ten days, and the total time in the larval stage was twenty-two days. In the case of the egg hatching on May 7, the duration of the first three instars was 4-6 days, that of the fourth instar was twelve days, and the total time in the larval stage was twenty-seven days.

The feeding habits of the larvae were quite similar to those of the *I. augustinus* larvae on *Vaccinium* as described by COOK (1906). The new-born larva crawled up the flower pedicel and entered the blossom either directly through the opening or by eating a small hole near the base. It then fed upon the inner part of the flower until late in the second or early in the third instar. During the first instar, the larva remained entirely concealed within the blossom; later, it lay along the pedicel or along the outside of the flower with the anterior extremity well within the blossom or, alternatively, was entirely within the flower but with the posterior extremity visible at the lip of the blossom. In this latter position, the pinkish color of the posterior tip of the larva matched very closely the color of the lip of the blossom. In this position, the larva cast the pellets of excreta outside of the flower. When the larva lay along the flower pedicel with the anterior extremity within the blossom, the interesting observation was made that it sometimes raised the pellets of excreta deliberately over its back and deposited them on a ball of similar pellets held between two flower pedicels by a silken net or alternatively, flipped them some distance away by means of the anal comb. From the third instar on, it ate the developing berries which were sometimes devoured completely and sometimes hollowed out, leaving only the skin intact.

COOK (1906) mentions that his larvae did not form "cocoons" prior to pupation. The earlier larva reared during the course of this study was given no opportunity to do so. The later of the two did form a rude shelter by binding together three or four leaves of the Bearberry with a few strands of silk on the floor of the breeding cage. It is, of course, not known whether this was *I. augustinus* or *I. polios,* although the considerations mentioned above lead to the suspicion that it may have been the latter.

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18 Baltusrol Place, Summit, New Jersey, U. S. A.

CHROMOSOME NUMBERS OF SOME JAPANESE RHOPALOCERA

by KODO MAEKI and SAJIRO MAKINO

The order Lepidoptera has long furnished favorite material for cytological study, and extensive studies of the chromosomes have been carried out, mainly from the cyto-taxonomic standpoint. With reference to the list of the chromosome numbers in animals, published by MAKINO (1951), it is evident that the list of the known chromosomes in the Heterocera, or moths, including about 170 species, is larger than for the Rhopalocera, of which about 150 species are known. So far as the authors are aware, the comparative studies of the chromosomes have been published by BELIAJEFF (1930), FEDERLEY (1938), LORKOVIC (1941), and some others, mainly with European butterflies. Our knowledge of the chromosomes of Japanese butterflies, however, is very meager. In view of this the present authors have undertaken the chromosome study of Japanese species of butterflies since 1951, to contribute something in this unexplored field, and made clear the chromosome numbers of 52 species of butterflies which were mostly obtained in the vicinity of Sapporo, Hokkaido. This report seems to furnish the first comparative study which deals with butterfly chromosomes in Japan.

All the butterflies used as material for the present study were collected during 1951 and 1952. They belong to seven families. They include 52 species of the Rhopalocera, namely: 1 species of Libytheidae, 7 species of Lycaenidae, 21 species of Nymphalidae, 5 species of Papilionidae, 7 species of Pieridae, 8 species of Satyridae, and 3 species of Hesperiidae. In most cases, the testes obtained from mature adults were used in this study. For the fixatives, Allen's P. F. A.-3 solution, Allen-Bouin's mixture, Allen's B-3 solution, and Benda's fluid were employed. The sections were made according to the paraffin method and stained with Heidenhain's iron-haematoxylin with a counter-stain of light green.

In all species studied here, the spermatogonial chromosomes were not observed. The haploid chromosomes in both primary and secondary spermatocytes came under study. It is notable that the chromosome number of *Pieris melete* shows a variation ranging from 27 to 31. The basic number was determined as 27. The cause of the numerical variation lies in the presence of supernumerary chromosomes. The supernumeraries vary from 1 to 4, each represented by a minute element. The species coming under study and the chromosome numbers established are listed in the table. The species having numbers around 30 (n) are most numerous, being 73% in frequency. The chromosome number of the species studied ranges from 14 to 36; between these extremes the following numbers; 24, 25, 26, 27, 28, 29, 30, 31 are represented. The species having 31 chromosomes (n) are most frequent, being 35%. Those with 30 chromosomes rank second. The numerical condition found in the present study is quite similar to that in moths. Among the species concerned here, there is no evidence for the presence of polyploidy.

The authors wish to acknowledge their gratitude to Dr. C. L. REMINGTON, of Yale University, who kindly recommended that we publish this short note in *The Lepidopterists' News,* while the senior author (S. M.) visited his laboratory.

CHROMOSOME NUMBERS OF JAPANESE BUTTERFLIES STUDIED BY THE AUTHORS

Species	*n* (haploid number)
HESPERIIDAE	
Daimio tethys Mén.	30 (I) *
Halpe varia Murray	31 (II)
Parnara guttata Brem. & Gray	16 (I)
PAPILIONIDAE	
Papilio xuthus Linné	30 (I)
Papilio machaon hippocrates Feld. & Feld.	31 (I)
Papilio maackii Mén.	30 (I)
Papilio protenor demetrius Cram.	30 (I)
Papilio bianor Cram.	30 (I)
PIERIDAE	
Aporia crataegi Linné	25 (I)
Anthocaris scolymus Butler	31 (I)
Colias hyale Linné	31 (I)
Eurema hecabe Linné	31 (I)
Pieris rapae Linné	26 (I, II)
Pieris napi Linné	25 (I)
Pieris melete Mén.	27, 28, 39, 30, 31 (I, II)
SATYRIDAE	
Coenonympha oedippus Fab.	29 (I)
Lethe diana Butler	29 (I)
Lethe sicelis Hew.	29 (I)
Mycalesis francisca perdiccas Hew.	29 (I)
Mycalesis gotama Moore	28 (I)
Neope goschkevitschii Mén.	28 (I)
Satyrus dryas Scop.	28 (I)
Ythima argus Butler	29 (II)
LIBYTHEIDAE	
Libythea celtis Fuessl.	31 (I, II)
LYCAENIDAE	
Celastrina argiolus Linné	25 (II)
Neozephyrus taxila Bremer	24 (I)
Curetis acuta paracuta Nicé.	29 (I)
Lycaena phlaeas Linné	24 (I, II)
Zizeeria maha argia Mén.	24 (I)
Everes argiades Pallas	24 (I)
Arhopala japonica Murray	24 (I)
NYMPHALIDAE	
Argynnis charlotta	29 (I, II)
Argynnis laodice Pallas	31 (I)
Argynnis ruslana Motsch.	26 (I)
Argynnis paphia Linné	29 (I)
Argynnis anadyomene Felder	36 (I)
Aglais urticae Linné	31 (I)
Apatura ilia Schiff.	31 (I)
Araschnia burejana Brem.	31 (II)
Araschnia levana Linné	31 (I)
Brenthis ino Rott.	14 (I)
Hestina japonica Feld. & Feld.	30 (I)

* (I) denotes the first spermatocyte and (II) the second spermatocyte.

Kaniska canace Linné	31 (I)
Limenitis camilla Schiff.	30 (I, II)
Limenitis glorifica Fruhst.	30 (I)
Neptis aceris Lep.	30 (I, II)
Nymphalis io Linné	31 (I, II)
Nymphalis xanthomelas Esper	31 (I)
Polygonia c-album Linné	31 (I)
Polygonia c-aureum Linné	31 (I)
Sasakia charonda Hew.	29 (I, II)
Vanessa indica Herbst	31 (I, II)

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Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, JAPAN

THE EXCELSIOR COMPLEX

by NICHOLAS SHOUMATOFF

In view of the variety of interesting hypotheses offered recently to explain the phenomenon of acrophilia in butterflies — their habit of sometimes lingering on hilltops — it may be helpful to recapitulate, and at the same time offer a simpler classification of alternatives, as follows:

Specific Cause	*General Type*	*Reference*
Search for foodplant	Biological	Merritt, *Lepid. News* 6:101
Emergence on hilltop	"	Arnhold, *Lepid. News* 6:99
Search for females	"	" " " "
Wind	Involuntary	Merritt, *Lepid. News* 6:101
Tropism	Element of Play	" " " "
Gregariousnness	" " "	" " " "
Liking hilltops	" " "	" " " "
Social ambition	Competition	Rawson, *Lepid. News* 5:70
Male battleground	"	" " " "

In analyzing this problem, I believe it is important to distinguish between the influences of macro- and microtopology. The former involves the well known phenomena of isolation of Lepidoptera on mountain tops due to vertical temperature gradient or geological history. I assume it is only the question of small, local hilltops that is at issue here.

A few pertinent observations of my own, which might be added to those already discussed, are: (1) *Anthocharis genutia* F. on a hilltop above Numeral Rock at Kent, Conn.; (2) *Pieris rapae* L. near the top of RCA Building in New York; (3) *Vanessa virginiensis* Drury flying back and forth across the top of the Cathedral of Learning in Pittsburgh; (4) *Papilio thersites* Fabr. (males only) circling for hours in a tight circle or ellipse on certain hilltops in Jamaica, B. W. I., and attacking all other Lepidoptera that came in sight. Extended, close range moving pictures of *P. thersites* engaged in this activity were shown at the first annual meeting of the Lepidopterists' Society at New York in 1950. (5) Hilltops were reported as localities for quite a number of Jamaican species by Avinoff and Shoumatoff, *Annals Carnegie Museum,* 30:263-295; 1946.

It is my personal opinion that the fondness of certain butterflies for hilltops may be explained as a compromise between their natural urge to exercise their power to defy the laws of gravity, and their fear of rising too high above the earth, exposing themselves to natural enemies, the birds. At the psychological level, I have observed that this involves the elements of both play and competition, and I further believe it involves the same type of exaltation at the achievement of a summit which impels men to risk their lives for this purpose. To deny that there exists an element of pure sport in the behavior of butterflies is in my opinion not in keeping with the spirit of open-minded scientific investigation.

It may be of interest to quote an excerpt from a ten-year-old unpublished manuscript in which I tried to record some of my very pleasant experiences while collecting butterflies with the late Dr. ANDREY AVINOFF in Jamaica (in this the distinction between macro- and microtopology was not made):

"In addition to being a continuation of these past mountain climbing experiences, our stay on Blue Mountain Peak was also to be the supreme test of a theory about butterfly collecting that was developed by Miss LILLY PERKINS. On the previous occasion when Uncle and I visited the Peak for a few hours, we had not had time to make a thorough investigation.

"Miss PERKINS is a charming and talented lady who was born and raised in Jamaica. She had spent a considerable part of her life in catching butterflies, with the aid of her father, who was a civil engineer. Together, they had discovered more new species of butterflies from Jamaica than any other group of collectors. Nearly all of these had been caught in her own back yard at Baron Hill, which was an old estate in the Trelawney Mountains of western Jamaica.

"It was at Baron Hill that Miss PERKINS discovered the strange phenomenon of many rare butterflies congregating in one small spot, which happened to be the highest point of the surrounding country. There these normally energetic and elusive insects would linger lazily, sometimes sailing around in a tiny circle for hours at a time. This pastime was the particular favorite of one species, the belligerent *Papilio thersites,* a rare yellow swallowtail, who always established himself at the dead center of maximum elevation, and forced all others, large and small alike, to stay out of his own little vicious circle. On this one small knoll at Baron Hill, Miss PERKINS had found, in

the course of years, nearly all the different butterflies that are now known from Jamaica. As a result, her name had become known to entomologists all over the world.

"When we visited Baron Hill on our second trip to the island, Miss PERKINS took us to her back yard, where we saw all these wonderful things with our own eyes, and even recorded them with moving pictures. But this discovery was to cost us a vast number of foot-pounds of unnecessary work. After leaving Baron Hill, we felt duty bound to climb every hill in sight to investigate what we called the Excelsior Complex of butterflies.

"In Jamaica, this was practically an unlimited task. Ever since COLUMBUS made his classical demonstration for Queen ISABELLA, the island's mountainous character has been notorious. After his return from that fateful voyage when he was marooned in Jamaica for a year, the Queen asked him to describe what this new possession of hers looked like. Instead of using words, he constructed a model of the island. With an eloquent gesture, he crumpled a piece of paper and tossed it on the table.

"We realized of course that not every hill was a Baron Hill. But we took the long, hard way in learning just how rare the phenomenon actually was. It was Uncle who grasped the point first. My own obsession with the Excelsior Complex got so bad that Uncle had to shield my eyes to keep me from noticing some hill we hadn't climbed. Of the many ascents we did make, the great majority were absolutely fruitless. At the top of one exhausting hill near Mile Gully, called Bunker Hill, alias Mocho Mountain, we found nothing but the grave of a sea captain who was buried there forty years before, in accordance with his last will and testament. A path had been cut through the virgin bush to get him there, and now it was almost completely erased by the resurgent jungle. Undoubtedly we were the first ones to have looked on that grave since many years ago, and our climb became part of the local legend.

"Actually we had never yet found another high spot quite as good for butterflies as Miss PERKINS' back yard. But we still had a lot of faith in the Excelsior Complex. Here on Blue Mountain Peak, at the highest spot of the whole island, it would have its ultimate test, if only the sun would come out for a few minutes... After lunch, the sun stayed shining for the rest of the day. But this was destined to be its last appearance during our sojourn on the summit. We took advantage of it to catch all the butterflies that we could. This energetic afternoon was climaxed by the capture of a Red Admiral [*Vanessa atalanta* L.]. This fast insect, though fairly common in the temperate zones all over the world, was previously unknown from Jamaica. It was a prized catch that fully vindicated the theory of the Excelsior Complex."

Bedford, N. Y., U. S. A.

CONGREGATION OF BUTTERFLIES AT HILLTOPS

by Geoffrey Beall

Observations by Merritt (1952), and by Rawson (1951), establish fairly clearly that at times butterflies (particularly *Anthocaris midea* Hbn.) may tend to appear with some frequency—let us say congregate—at hilltops; this is not invariably so, as is shown by the observations of Mather (1952). Since there is no obvious explanation in terms of food plants or other simple attractions, there is thus raised the very interesting question of why they should so congregate. The particular question here raised seems, to the writer, to be involved in the broad question of whether lepidopterists may not seriously and unfortunately ignore certain aspects of the mechanism of insect movement. What is already known about such movement, particularly in the case of the Monarch Butterfly, *Danaus plexippus* L. and of the locust, *Schistocerca gregaria* Forsk., may be sufficient to explain the congregation of butterflies.

The writer suggests that butterflies, at times, may tend to drift with considerable unanimity up a hillside and then congregate in some measure when such movement is somehow barred at the top of the hill. It is only necessary to suppose that a butterfly engages, to some extent, in what Williams (1930) calls unidirectional flight and that this movement is somewhere interrupted to cause congregation. It is true that Williams is interested in unidirectional flight principally from the view-point of migration, *i.e.,* flight long continued predominantly in a single direction and which results in the translocation of whole populations of butterflies. Fairly consistent flight in one direction may, however, occur for short times but be succeeded by other movements so that as a net effect there is no appreciable migration. Unidirectional movement has been noticed by the writer (probably many people have noticed it) in the case of Cabbage Whites which on days of light wind tend to move across country into the wind. He also believes he has noticed it in the case of the Mourning Cloak and various swallow-tails. If such movement ceases when the butterfly meets slightly stiffer wind (as at a hilltop) congregation may occur. The situation is reminiscent of the well-known congregations of Monarch Butterflies and less widely known congregations of Odonata and Muscid flies that frequently occur on the shores of the Great Lakes. Perhaps a closer analogy is the tendency for monarchs, when in the general regions mentioned, to fetch up in the lee of a hillock or clump of trees.

The mechanics of the type of movement just indicated has been discussed at some length by Kennedy (1951) for the Desert Locust, *S. gregaria.* His observations and deductions were similar to those of the writer (Beall, 1941) in connection with the Monarch Butterfly. Various things may be conceived as happening at a hilltop. An insect may tend to move fairly close to the ground against a moderate wind which is coming fairly directly over a ridge. On obtaining the top, the insect may respond to the problem of increased wind velocity by rising. Such response may be necessary to the insect for a kind of psychological reason, discussed at some length by Kennedy. The response, of course, only increases its tendency to lose ground against the wind so that at its increased height it tends to be forced backward. The tendency subsequently is for the insect to drop so that it is again some distance down the hill and close to the

ground and is able to fly against the wind; it presumably then starts another cycle. There is thus set up a sort of vertical eddy of insects which tends to hold them at the hilltop. KENNEDY has described also a case where the wind came across a ridge not directly but at an angle. The movement (of locusts) was then principally up the slope to the crest and then along the ridge just below the crest in a body. Of course, for locusts the situation is complicated by the contagious effect of their necessity to move parallel to one another, but this effect would probably not be important in the case of butterflies. They might meet a wind at an angle by drifting along and down the ridge for a time and subsequently move in the opposite direction along the ridge and then up it. Such behavior would create the kind of horizontal eddies observed by MERRITT.

MERRITT describes a point where three ridges converge in a small plateau and where there were frequently *A. midea.* This would be a very likely spot for congregation because any wind would almost always be across some one of the three ridges. A most serious objection to the present explanations is MERRITT'S observation that he has seen butterflies on ridges during windless days. The observation would bear checking; perhaps on these days there was a very light wind, that was still sufficient successively to orient and to stop the flight of *A. midea.*

MERRITT and RAWSON stress the curious fact that congregations at hilltops are principally of males. May we not easily suppose that any tendency towards WILLIAMS' unidirectional flight or any tendency to discover barriers of changed stimulus differ for the sexes? Obviously the general character of flight does so differ; thus during the summer female Monarchs tend to fly among the herbage but males above it.

We may note that the tendency for unidirectional flight probably varies according to species and, again, the stimuli necessary to cause or terminate such flight must be specific. We do not know how various is the tendency to move upwind. We might look for it particularly among the Pieridae and Papilionidae that MERRITT says have a tendency to congregate at hilltops. Quite obviously the question of what wind is moderate and capable of directing flight—rather than stopping it—must vary with species. We may expect the Papilios to deal with relatively high winds; MERRITT says they generally fly at more than eight feet from the ground. We may expect *A. midea,* which he says seldom rises above four feet, to move into a very light wind and be stopped by a comparatively small increase in wind velocity.

It is neither possible nor necessary to explain fully the dynamics of butterfly flight. All that is pleaded is that insects are known to move steadily in some one direction for considerable distances without any reasonable objective but merely in response to some steady stimulus like wind, and that such movement may be terminated by a quantitative change in the stimulus, such as may occur at a hilltop. There the response may easily result in a movement at the crest rather than a continuation of flight over it. Perhaps MERRITT and others might consider the general hypothesis suggested here and test it against the actual facts in the field. Let them note cases where such congregation of butterflies occurs and see whether it may probably be explained by such wind barriers as are suggested. The circumstances under which they should anticipate congregation cannot be given; the secret probably lies in observing the character of flight at

hilltops under various conditions of wind. The matter might perhaps be best studied with the Papilios for which the movement might be bold and clear.

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Statistical Lab., University of Connecticut, Storrs, Conn, U. S. A.

PAPILIO ZELICAON AND HILLTOPS

by Richard Guppy

In the southeast parts of Vancouver Island, *Papilio zelicaon* Lucas is very noticeably commoner on the summits of mountains than in the adjacent valleys. I have regarded this merely as proof that the species prefers the high altitude, but the recent discussion in the *Lepid. News* on butterflies and hilltops, has prompted me to give this theory a more careful scrutiny.

First, does *P. zelicaon* really prefer a high altitude, or for that matter is there really such a thing as an alpine butterfly, in the strict sense of the word? I have an idea that it is a matter of climate, rather than altitude. On V. I. there are only two species, *Plebeius aquilo* Bdv. and *Lycaena mariposa* Reak. that cannot be taken at or near sea level. Probably both will be found at low altitude further north. *P. zelicaon* occurs in California; it does not appear to be a species strictly adapted to short summers.

On Mt. Benson, altitude 3300 ft., the collector can depend on finding *P. zelicaon* flying at the extreme summit, though they are very seldom seen during the climb. Since they are nearly impossible to net, due to their wariness and the precipitous nature of the terrain, I have never been able to catch enough to decide whether any females are present. A host plant could be in the vicinity, but I have not located it. Wherever I have taken female *P. zelicaon* intent on oviposition, I have always found nearby tall, conspicuous Umbelliferae such as *Heracleum lanatum* Michx. There are certainly no such plants on Mt. Benson. Any Umbelliferae there must be small and easily overlooked.

Had I collected only on Mt. Benson, I might be tempted to conclude that the butterflies congregate on the mountain top, while mating, and the females, always more difficult to find than the males, later disperse to the valleys to search for their host plants. But further observations do nothing to strengthen this theory. *P. zelicaon* is a common species above tree line on Mt. Arrowsmith.

In order to reach any open country near sea level where host plants might be found, these butterflies would have to travel through or over at least five miles of dense coniferous forest. As on Mt. Benson, I have been unable to find any likely looking plants near the summit.

The extreme summit of Mt. Arrowsmith, altitude about 6000 ft., is hardly a safe playground for net addicts. In fact, being always alone on these expeditions , I have never attempted to scale it. About 2 miles distant, a sort of preliminary peak, referred to by hikers as "the hump", rises to 5400 ft. This is easily climbed and has a small flat area on top. I have never failed to find several *P. zelicaon* resting on this peak. It is virtually impossible to catch them. They rise before one is in swinging range, circle out over the abyss, and return again just out of reach.

While these butterflies are not confined to "the hump", there is certainly no other spot, even if one allowed an area many times as large, where they could always be found. In the dense forest, which extends upwards to about 4800 ft., I have never seen *P. zelicaon* or any other butterflies. On my last visit to Mt. Arrowsmith, one fresh female *P. zelicaon* was captured just at tree line on the upward climb. Later a number of specimens were seen at scattered points in the valley between the hump and Arrowsmith proper. Here two males were captured, and one pair was seen flying *in coitu.* Conditions on the hump were as usual, five or six *P. zelicaon* there, but I never came close to netting one.

P. zelicaon is one of the very few butterfly species which thrive on the humid west and northeast coasts of V. I. Here I have found them always close to the sea. On the west coast I have caught occasional specimens hovering around clumps of *Heracleum,* on beaches exposed to the open ocean. At the north of the island they seemed to like one particular spot, a marshy tidal flat at the head of a long inlet. Here again the food plant was not difficult to locate. It was not *Heracleum;* I do not know the species.

Some years ago my brother, who has spent many summers on the west coast, mentioned in a letter that "swallow tails" always like to fly around rocks. Unfortunately I have not kept the missive, and I have forgotten his exact words. But this statement was definitely not coached; I had never at that time noticed any proclivity for rocks or hill tops on the part of *P. zelicaon.* In fact I had not yet managed to find their east coast haunts.

I am aware that the above jumble of observations proves nothing. I can only hope that they will add something to the pattern, and eventually we will learn why *Papilio zelicaon* likes hilltops.

R. R. 1, Marine Drive, Wellington, V. I., B. C., CANADA

ABERRANT FEEDERS AMONG JAPANESE LYCAENID LARVAE

by Tarô Iwase

In Japan, there are about 58 Lycaenidae. Almost all are known to be phytophagous and many are myrmecophilous at the same time. Among them two species of *Maculinea, M. euphemus* and *M. arionides,* are phyto-predaceous exactly like *M. arion* of Europe, and the third one, *Niphanda fusca,* is fed by a kind of ant with the excretion of aphids, a facsimile of the Ethiopian *Lachnochnema bibulus* (subfamily Lachnocneminae of Hinton, 1951). At the same time, the homopterophagous habit has been known for *Taraka hamada,* like the Nearctic *Feniseca tarquinius,* Indo-Australian *Spalgis epius,* and Ethiopian *Spalgis lemolea* (subfamily Gerydinae and/or Spalginae of various authors). Recently, a thecline larva, *Thecla jonasi,* was quite unexpectedly and unprecedently found as aphidivorous. As a result, we know five aberrant feeders among Japanese lycaenid larvae at present.

The sixth, if any, and probably the last, aberrant feeder of our lycaenids may be *Spindasis takanonis,* of which the younger stages have been only partially studied.

1. *Maculinea euphemus* Hübner [Group II of Balduf (1938) or also group II of Hinton (1951)]. The phyto-predaceous habit of this European form was observed by Dr. T. A. Chapman in 1919. This habit has been confirmed in Japan on two local races: *kazamoto* Druce (in central Honshu) and *shiriyensis* Matsumura (in northern Honshu). The larva feeds at first on flowers of burnet (*Sanguisorba*) and then on ant-grubs of *Myrmica.*

2. *Maculinea arionides* Staudinger. This nearest ally to *M. arion* was supposed at first by Dr. Chapman to be phyto-predaceous and cited as such by Clark (1926). Recently, the habit was confirmed by a junior high school student by the name of Sôta Hiraga, on subsp. *takamukui* Matsumura. The larva feeds at first on flowers of *Plectranthus exisus* Maxim. (Labiatae) and then on ant-grubs of (probably) *Myrmica.*

3. *Niphanda fusca shijima* Fruhstorfer [a new corollary to group VI of Balduf, or group IV of Hinton]. The remarkable ant-friend habit of this larva was first observed by F. Nagayama in the course of 1948-9 (*Lep. News* 6: p. 43). This species is excretophagous-glanduliferous and quite similar in habit to the African *Lachocnema bibulus* as studied by Cripps and Jackson (1940). The larvae are fed orally by the host-ants *Camponotus herculeanus japonicus* Myr. by the latter's disgorging of liquid foods, in and after the third instar in ant-runs, where they hibernate and pupate. *Niphanda* larvae feed directly on the excretion of dwarf-oak aphids, *Greenidea kuwanai* Pergande, in their first two instars. The difference between *Niphanda* and *Lachnocnema* lies only in that the former is related with Eriosomatidae (Homoptera), while the latter is so with Membracidae (also Homoptera). Fine photographs on the symbiosis were taken by S. Tamura, with the aid of T. Ishizawa who had also assisted Mr. Nagayama in latter's original research. They are published in Tamura's "Closeups of Insects" (1951).

4. *Taraka hamada* Druce [amyrmecophilous-homopterophagous: group III-A of Balduf or group III-A-1 of Hinton]. The aphidivorous habit of this larva was published by T. Tsuchida as early as 1898 in *Dôbustugaku Zasshi* (the Zoological Magazine 10:358-), but has not been referred to in

any literature written in European languages. SEITZ, in *Gross-Schmetterlinge der Erde* I. (1909), suspected this genus to be placed near *Spalgis* or *Gerydus*, but he remarked "Wohin sie tatsächlich gehört, wird erst die Entwicklungsgeschichte aufklären" (S. 323). In short its habit resembles very much to that of *Feniseca tarquinius* and only differs in that the *Taraka* larvae prey upon the bamboo-aphid, *Oregma japonica* Takahashi, while *Feniseca* larvae feed on alder-aphids etc. The pupae as well as larvae are also not unlike those of *Feniseca.* There is a less-known episode concerning these two distantly located aphidivores. Mr. TSUCHIDA got some hints from Dr. ALBERT KOEBELE, the famous American expert on biological control of insect pests, who en route to Australia visited Japan in 1894-5 and told Mr. TSUCHIDA the fascinating story about the discovery of *Feniseca's* habit in 1886.

5. *Thecla* (*Shirôzua*) *jonasi* Janson [the feeding habit of this larva can be placed under group III-B of BALDUF or group III-A-2 of HINTON, but the taxonomic position is quite remote from the hitherto known members of these groups such as *Gerydus* spp., and quite unique among the broad genus *Thecla* (old *Zephyrus*), the members of which are all phytophagous in the strict sense, so far as I know]. The aphidivorous habit was first discovered in 1951 by MASASUKE INOUE, who took an excellent photograph of the scene and displayed it in *Shin Konchû,* vol. 5 (1952). The larva I examined has specialized mouthparts and highly developed claws on the prothoracic legs. It has neither a slit-like honey gland nor a pair of retractile tubercles. It, however, has rows of stout club-like bristles on the back of the prothorax and 7th and 8th abdominal segments, and a pair of long tufted hairs on the front edge of the prothorax. Fringes around the body also have long hairs. Eggs are laid among the aphids on dwarf-oaks, and pupae are found in ant-runs.

All the above species are single brooded, except *Taraka* which has several broods in a year. They hibernate in the larval stage with the exception of *Thecla,* which winters as the egg.

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Appendix. Entomophagous Moths in Japan

1. *Epipomponia nawai* Dyar: on *Tanna japonensis* Distant, *Oncotympana maculaticollis* Motsch., *Graptopsaltria nigrofuscata* Motsch., and *Meimura opalifera* Walker (all Cicadidae).
2. *Epiricania hagoromo* Kato: on *Ricania japonica* Melichar (Ricaniidae), *Euricania ocellus fascialis* Walker (Ricaniidae), *Dictyophara patruellis* Stål (Dictyopharidae), and *Oliarus subnubilis* Uhler (Cixidae).
3. *Oedematopoda igniptica* Butler: on *Oregma japonica* Takahashi (Eriosomatidae) on bamboo and allied plants.
4. *Oedematopoda semirubra* Meyrick: on bamboo woolly aphids.
5. *Pyralis regalis* Schiff. & Denis: on *Vespa mandarina* Smith (Vespidae).
6. *Hypsopygia regina* Butler: on *Polistes japonicus* Saussure (Vespidae).
7. *Hypsopygia mauritalis* Bdv.: on *Polistes japonicus fadwigae* Dalla Torre.

343 Komachi Kamakura, Kanagawa-Ken, JAPAN

CORRELATIONS BETWEEN "PUPAL VOLUME" AND WING-RADIUS AND WEIGHT IN BUTTERFLIES

by P. H. H. Gray

In a previous article the author (1951) described an experiment made to test the effects of different relative humidities on the pupae and imagines of *Papilio polyxenes* Fab., reared together from eggs laid in 1950 by one female. It is well known that females generally have larger wings or are of larger "build" than males. It was noted, however, that the wild males caught in 1950 were larger than the females of that year. It is also known that the future sex of the butterfly, or moth, can, in some species, be detected structurally in the pupal stage.

During the incubation of the pupae in the experiment mentioned above, 28 of the pupae were measured for length and for breadth to the nearest millimeter. The product of those two measurements has been called the "pupal volume index" for use in the analyses reported below. It was observed that these values had a very wide range, and it seemed possible that they might be of some use in predicting the sex of the future butterfly, on the assumption that the larger pupae would yield females.

The emerged insects, consisting of 15 males and 13 females, were mounted in the usual manner; when dry, the right fore wing was measured from the base to the farthest extent of the apex, also to the nearest millimeter; this value was doubled for use in the analyses. Each butterfly was then weighed, to the nearest milligram, on a beam balance; the weight of the pin, derived from weighing 100 pins of the same gauge, was subtracted to obtain the weight of each butterfly.

The range and average values for each of the variates were as follows:

	RANGE	AVERAGE
Pupal volume index	182-288	226
Wing-radius, mm.	68-80	76
Weight, mgm.	76-160	109

A series of analyses was made to ascertain if there was a correlation between any two of the variates. It is useful, before proceeding with a mathematical analysis, to prepare a "correlation diagram" on graph or co-ordinate paper, on which one variate, *e. g.* weight, is plotted against another, assumed to be in some way related to or even controlling or being controlled by it; *e. g.,* volume or wing-area. Fisher (1941) explains the purpose of this preliminary operation thus: " When this is done as a dot diagram, a number of dots are obtained each representing a ... pair of observations, and it is usually clear from such a diagram whether or not any close connexion exists between the variables". Since in the present case there appeared to be a close connexion between the variates in each pair, an analysis was made to determine the correlation coefficient, *r,* for each of the three paired variates. The following results were obtained:

CHARACTERS COMPARED	r VALUE	
Pupal volume index *vs.* weight	0.988	Significant
Pupal volume index *vs.* radius	0.995	Significant
Weight *vs.* wing-radius	0.982	Significant

As each of the three paired variates showed positive correlations of a high order of significance, and as in each correlation diagram the dots representing the values for the females occupied an array distinctly removed from those for the males, in that the values for the former were higher, further analyses were made to ascertain if the mean values for the two sexes were significantly different in each set. The values obtained for the statistic t (see Fisher, 1941) for the three characters are given below:

	MALES	FEMALES	t
Pupal volume index	204	230	3.314
Wing-radius, mm.	73	80	6.825
Weight, mgm.	93	131	5.767

The t values indicate that the mean values are significantly different. It would be of interest to ascertain, by means of a much larger number of observations, if the measurement "pupal volume index" could be used to determine the sex of the future butterfly, either in this species or in others.

The same measurements and analyses have been made of pupae and imagines reared from eggs of *Pieris rapae* L. in 1951. The larvae were reared on *Barbarea vulgaris* L. (Winter Cress) or on a species of *Arabis*. The pupae were measured for length and breadth to the nearest 0.025 inch, and the product converted to the millimeter values. The butterflies were not spread before being dried. Since weighing such light objects on a beam balance is tedious work, a "wire balance" was devised, suitable for weighing objects up to about 60 milligrams; the device has been described in a separate article.

The ranges and average values are given below for each of the variates in two populations, consisting of 28 specimens reared from eggs collected at random and 34 reared from eggs laid by one ♀ (averages in parentheses):

POPULATION	PUPAL VOLUME INDEX	WING-RADIUS (MM.)	WEIGHT (MGM.)
28 random	58-109 (80.4)	36-52 (46)	8.4-27.5 (19.8)
34 *ex* single ♀	63-94 (79.3)	44-50 (46)	15.0-26.3 (20.5)

It will be seen that the specimens from the random set are much more variable than those of the one ♀. The following correlations were found:

CHARACTERS COMPARED	RANDOM 28	SINGLE 34
Pupal volume *vs.* weight	0.994..........	0.981
Pupal volume *vs.* radius	0.995..........	0.994
Weight *vs.* radius	0.991..........	0.966

The r values are all of a high order of significance. It was not possible, however, to distinguish between the sexes in any one of the variates.

References

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Box 236, Macdonald College, Quebec, CANADA

BUTTERFLY COLLECTING IN WYOMING, 1952

by VLADIMIR NABOKOV

A visit to Wyoming by car in July-August 1952 was devoted to collecting in the following places:

Southeastern Wyoming: eastern Medicine Bow National Forest, in the Snowy Range, up to approximately 10,500 ft. alt. (using paved road 130 between Laramie and Saratoga); sage brush country, approximately 7,000 ft. alt., between Saratoga and Encampment, east of paved highway 230; marshes at about the same elevation between eastern Medicine Bow National Forest and Northgate, northern Colorado, within 15 miles from the Wyoming State Line, mainly south of the unpaved road 127; and W. Medicine Bow National Forest, in the Sierra Madre, using abominable local road from Encampment to the Continental Divide (approximately 9,500 ft. alt.).

Western Wyoming: sage brush, approximately 6,500 ft. alt. immediately east of Dubois along the (well-named) Wind River; western Shoshone and Teton National Forests, following admirable paved road 26, from Dubois towards Moran over Togwotee Pass (9,500 ft. alt.); near Moran, on Buffalo River, approximately 7,000 ft. alt.; travelling through the construction hell of the city of Jackson, and bearing south-east along paved 187 to The Rim (7,900 ft. alt.); and, finally, spending most of August in collecting around the altogether enchanting little town of Afton (on paved 89, along the Idaho border), approximately 7,000 ft. alt., mainly in canyons east of the town, and in various spots of Bridger National Forest, south-western part, along trails up to 9,000 ft. alt.

Most of the material collected has gone to the Cornell University Museum; the rest to the American Museum of Natural History and the Museum of Comparative Zoology.

The best hunting grounds proved to be: the Sierra Madre at about 8,000 ft. alt., where on some forest trails I found among other things a curious form (not *S. secreta* dos Passos & Grey) of *Speyeria egleis* Behr flying in numbers with *S. atlantis hesperis* Edw. and *S. hydaspe purpurascens* H. Edw., a very eastern locality for the latter; still better were the forests, meadows and marshes about Togwotee Pass in the third week of July, where the generally early emergences of the season were exemplified by great quantities of *Erebia theona ethela* Edw. and *E. callias callias* Edw. already on the wing; and also very good were some of the canyons near Afton.

Here are a few notes on what interested me most in the field: *Boloria, Colias,* certain Blues, and migratory or at least "mobile" species.

Of *Boloria* I got seven species, of the eight (or possibly ten) that occur within the region. Plunging into the forest south of route 130 on the western slopes of the Snowy Range, I found *B. selene tollandensis* B & McD. not uncommon on a small richly flowered marsh at about 8,000 ft. alt.; also on marshes north of Northgate and on Togwotee Pass. On July 8, I spent three hours collecting a dozen fresh specimens of *B. eunomia alticola* B. & McD., both sexes, on a tiny very wet marsh along the eastern lip of the last lake before reaching Snowy Range Pass from the west, possibly the same spot

where KLOTS had taken it in 1935 (*Journ. N. Y. Ent. Soc.* 45: p. 326; 1937). I met with the same form on a marsh near Peacock Lake, Longs Peak, Colorado, in 1947. Forms of *B. titania* Esp. (mostly near ssp. *helena* Edw.) were abundant everywhere above 7,500 ft. alt. By the end of July *B. freija* Thunb. was in tatters near Togwotee Pass (it had been on the wane in June 1947 on marshes near Columbine Lodge, Estes Park; and on Hoback River, Tetons, in early July 1949). Of the beautiful *B. frigga sagata* B. & Benj. I took two ♂ ♂ (fresh but frayed) near Togwotee Pass. Of *B. toddi* Holland ssp. I took a very fresh ♂ in early July in the Snowy Range at 8,000 ft. alt. and a couple of days later, acting upon a hunch, I visited a remarkably repulsive-looking willowbog, full of cowmerds and barbed wire, off route 127, and found there a largish form of *B. toddi* very abundant — in fact, I have never seen it as common anywhere in the west; unfortunately, the specimens, of which I kept a score or so, were mostly faded — and very difficult to capture, their idea of sport being to sail to and fro over the fairly tall sallows that encompassed the many small circular areas (inhabited only by *Plebeius saepiolus* Boisd. and *Polites utahensis* Skin.), into which the bog was divided by the shrubs. Another species I had never seen to be so common was *B. kriemhild* Strecker which I found in all the willow-bogs near Togwotee Pass.

In regard to *Colias* I could not discover what I wanted — which was some geographical intergradation between *C. scudderi* Reakirt, which I suggest should be classified as *C. palaeno scudderi* (Reakirt) (common everywhere in the Medicine Bow National Forest), and *C. pelidne skinneri* Barnes (locally common near Togwotee Pass and above Afton). I was struck, however, by the identical ovipositing manners of *C. scudderi* and *C. skinneri* ♀ ♀ which were common in the densest woods of their respective habitats, laying on *Vaccinium*. I found *C. meadi* Edw. very common on Snowy Range Pass. It was also present at timberline near Togwotee Pass and east of it, below timberline, down to 8,000 ft. alt. in willow-bogs, where it was accompanied by another usually "Hudsonian" species, *Lycaena snowi* Edw., the later represented by undersized individuals. (In early July 1951, near Telluride, Colorado, I found a colony of healthy *Colias meadi* and one of very sluggish *Pyrgus centaureae freija* Warren in aspen groves along a canyon at only 8,500 ft. alt.) On a slope near Togwotee Pass at timberline I had the pleasure of discovering a strain of *C. meadi* with albinic ♀ ♀. The species was anything but common there, but of the dozen ♀ ♀ or so seen or caught, as many as three were albinic. Of these my wife and I took two, hers a dull white similar to *C. hecla* "pallida", mine slightly tinged with peach (the only other time I saw a white *C. meadi* was at the base of Longs Peak, 1947, where the species was extremely abundant).

In 1949 and 1951, when collecting *Lycaeides* in the Tetons, all over Jackson Hole, and in the Yellowstone, I had found that to the north and east *L. argyrognomon (idas) longinus* Nab. turns into *L. argyrognomon scudderi* Edw. but I had not solved the problem of the *L. melissa* strain so prominent in some colonies of *L. argyrognomon longinus* (*i. e.,* Black Tail Butte near Jackson). I had conjectured that hybridization occurs or had occurred with wandering low elevation *L. melissa* (the rather richly marked "Artemisian" *L. melissa* — probably in need of some name) that follows alfalfa along roads as *Plebeius saepiolus* does clover. In result of my 1952 quest the situa-

tion appears as follows. The most northern point where typical *L. longinus* occurs is the vicinity of Moran, seldom below 7,000 ft. alt. and up to 11,000 at least. It spreads south at those altitudes for more than a thousand miles to the southern tip of Bridger National Forest but not much further (I have not found it, for instance, around Kemmerer). I have managed to find one *L. melissa,* a fresh ♂, in August 1952 in a dry field near Afton, less than a mile from the canyon into which both sexes of *L. argyrognomon longinus* descended from the woods above. At eastern points of the Bridger and Shoshone Forests, *L. longinus* stops definitely at The Rim, west of Bondurant, and at Brooks Lake (about 7,500 ft. alt.) some twenty miles west of Dubois. Very small colonies (seldom more than half-a-dozen specimens were taken in any one place) of *L. melissa* were found around Dubois at 6,500 ft. alt. or so (agricultural areas and the hot dry hills). A colony of typical (alpine) *L. melissa melissa* as described by Edwards, was found just above timberline in the Sierra Madre. The search for *L. melissa* in various windy and barren localities in the sage brush zone in mid-July led to the finding of a rather unexpected Blue. This was *Plebeius (Icaricia) shasta* Edw., common in the parched plain at less than 7,000 ft. alt. between Saratoga and Encampment flying on sandy ground with *Phyciodes mylitta barnesi* Skinner, *Satyrium fuliginosa* Edw., and *Neominois ridingsi* Edw. It was also abundant all over the hot hills at 6,500 ft. alt. around Dubois where nothing much else occurred. I have not yet been able to compare my specimens with certain series in the Museum of Comparative Zoology, Harvard, but I suggest that this low-altitude *P. shasta* is the true *P. minnehaha* Scudder while the alpine form which I found in enormous numbers above timberline in Estes Park (especially, on Twin Sisters) and which collectors, following Holland's mislead, call *"minnehaha",* is really an undescribed race.

MIGRATORY SPECIES OBSERVED IN WYOMING, 1952

I distinguish two groups: (1) latitudinal migrants — moving within their zones of habitat mainly in a west-east (North America) or east-west (Europe) direction and capable of surviving a Canadian Zone winter in this or that stage. Mobile, individually wandering species of *Plebeius* and *Colias* belong to this group as well as our four erratically swarming *Nymphalis* species which hibernate in the imaginal stage. In early August the trails in Bridger National Forest were covered at every damp spot with millions of *N. californica* Boisd. in tippling groups of four hundred and more, and countless individuals were drifting in a steady stream along every canyon. It was interesting to find a few specimens of the beautiful dark western form of *N. j-album* Boisd. & Lec. among the *N. californica* near Afton. (2) longitudinal migrants — moving early in the season from subtropical homes to summer breeding places in the Nearctic region but not hibernating there in any stage. *Vanessa cardui* L. is a typical example. Its movements in the New World are considerably less known than in the Old World (in eastern Europe, for instance, according to my own observations, migratory flights from beyond the Black Sea hit the south of the Crimea in April, and females, bleached and tattered reach the Leningrad region early in June). In the first week of July 1952, this species (offspring mainly) was observed in colossal numbers above timberline in the Snowy Range over which the first spring flock had passed on May 28. according to an intelligent ranger. A few specimens of *Euptoieta*

claudia Cramer were in clover fields around Afton, western Wyoming, in August. Of *Leptotes marina* Reakirt, one ♂ was near Afton in August, with *Apodemia mormo* Felder and *"Hemiargus" (Echinargus) isola* Reakirt. Both *A. mormo* and *E. isola* plant very isolated small summer colonies on hot hillsides. The *H. isola* specimens, which I took also in Medicine Bow National Forest, are all tiny ones, an obvious result of seasonal environment, not subspeciation. *H. isola* [incidentally, this is not a Latin adjective, but a fancy name — an Italian noun originally — and cannot be turned into *"isolus"* to comply with the gender of the generic name, as done by some writers] belongs to a neotropical group (my *Echinargus)* with two other species: *E. martha* Dognin, from the Andes, and a new species, described by me but not named, from Trinidad and Venezuela [see *Psyche,* 52: 3-4]. Other representatives of neotropical groups *(Graphium marcellus* Cramer, *"Strymon" melinus* Hübner, *Pyrgus communis* Grote, *Epargyreus clarus* Cramer — to name the most obvious ones) have established themselves in the Nearctic more securely than *H. isola.* Among the migratory Pierids, the following were observed: single specimens of *Nathalis iole* Boisd. all over Wyoming; one worn ♂ of *Phoebis eubule* L. in the Sierra Madre (Battle Lake), July 9; one worn ♂ of *Eurema mexicana* Boisd., between Cheyenne and Laramie (and a worn ♀ near Ogallala, Neb.), first week of July.

Cornell University, Ithaca, N. Y., U. S. A.

COLLECTION OF SOUTH AMERICAN LEPIDOPTERA

The city museums of Villa Mirabello, in Varese, Italy, announce that a collection of almost 4,000 Lepidoptera has just been studied and classified by the engineer MARIO SIMONDETTI. The collection was given, fifty years ago, to the famous Italian tenor FRANCESCO TAMAGNO, during his stay in South America (he died in Varese in 1905). Only the family Geometridae and the few microlepidoptera are still to be studied. Visits by American specialists, as well as letters, would be very welcome. Write to: Direzione dei Civici Musei di Villa Mirabello, Varese, Italy.

FIELD AND TECHNIQUE NOTES

MIGRATION OF *VANESSA CARYE*

Driving westward over the Santa Rosa Mountains in southern California on March 29, 1952, the number of *Vanessa carye* Hbn. (the Western Lady) crossing in a northerly direction was quite striking. However, when we reached an altitude of about 3500 feet, it became obvious that we had encountered a true migratory movement of these butterflies. Any moment ten to twenty could be seen crossing the highway. At the highest point, just below 5000 feet, one hundred could be counted in less than three minutes flying over a narrow clearing. The butterflies flew low, fast, and unhesitatingly in a northerly direction. It was an unusual sight to see them cross patches of snow that were still deep in the depressions between the trees on the northern slopes.

HARRY SICHER, Loyola University, School of Dentistry, Chicago 12, Ill., U. S. A.

A HYBRID *LIMENITIS*

Of all the genera of North American butterfllies, the members of the genus *Limenitis* seem to be the most prone to hybridize in nature. Interspecific hybrids are known for many of the species, but, to the knowledge of the writer, the only published records of probable hybrids *L. archippus* Cramer and *L. astyanax* Fabr. (=*L. arthemis astyanax*) are those discussed by Scudder long ago (*Butterflies of the Eastern United States and Canada,* vol. 1: p. 283; 1889). The writer has recently obtained a specimen that is undoubtedly the result of such a cross.

The specimen was collected in September, 1948 (exact date unknown), at the Falls of the Ohio, Louisville, Jefferson County, Kentucky, by ROBERT STEILBERG and JERRY SMITH, two naturalists in the Louisville area. The region in question is probably the best in the Louisville area for *L. archippus.* Large numbers are found there in the fall of the year around willows along the river bank. *L. astyanax* is also common there as well as elsewhere throughout the state.

The particular individual was collected in a somewhat battered condition with the margins of both front and hind wings somewhat frayed. Examination at the time of collecting was made by the present writer, but the specimen was placed in the collection of Smith & Steilberg. Last month I acquired the specimen in still a further battered condition due to the ravages of dermestids, but still in good enough condition to verify the identification.

Its description is as follows: The ground color above is a dark brownish-orange, rather intermediate in color between the two species. There is an orange sub-marginal band corresponding to the orange submarginal area in *L. archippus*; the margins of the wings are as in *L. astyanax*; the veins above are slightly darkened, and the median dark band of *L. archippus* is faint but evident. The under side is very much like the upper, the sub-marginal orange band and dark veins present, except for the addition of the reddish spots of *L. astyanax*; these spots are represented by the ground color becoming orange from the dark brownish-orange ground color in the corresponding location of the spots of *L. astyanax.*

The specimen has been studied by JAMES R. MERRITT, of the University of Louisville, who agrees with the identification of the specimen as *Limenitis archippus* X *astyanax.*

BURT L. MONROE, JR., Ridge Road, Anchorage, Ky., U. S.A.

LYCAEIDES ARGYROGNOMON IN WISCONSIN

A series of *Lycaeides* was taken near Waubee Lake, in Oconto and Marinette Cos., Wisconsin, on July 1-15, 1952. Specimens were submitted to Professor VLADIMIR NABOKOV. His comments seem to be worth recording, and are given as follows.

"When I realized that the Blue you wanted identified came from Wisconsin, I foresaw it could be either of two species, the closest locality to Wisconsin being in one case S. Michigan and in the other Minnesota.

"S. Michigan specimens that I have studied belonged to the curiously isolated (type loc.: Albany, N.Y.) Great Lakes representative of *melissa* Edw. which I named *melissa samuelis* (Psyche, 1943, and Bull. Mus. Comp. Zool, 1949) (as you know, it used to be called "scudderi" in former days).

"The Minnesota thing, which I described and figured, but did not name, because of scantiness of material (Bull. Mus. Comp. Zool., 1949, p. 505, Pl. 5, fig. 54, male, Pequot, Minn.) is a subspecies of *argyrognomon* (Bergsträsser, Tutt), which I now think is sufficiently distinct from the Canadian (north of 50°) *argyrognomon scudderi* (type loc.: The Pas, west of Winnipeg L., Manit.) to warrant a new subspecific name for it.

"It is this form that your specimens belong to, and you should be congratulated on establishing the interesting Wisconsin range of *argyrognomon.* It comes very near to a point where it should fly together with *melissa samuelis* Nab.

"Your beautiful series will be deposited at the Museum of Comparative Zoology, Harvard College, where I have accumulated the most representative series of American *Lycaeides* in the world. I have nowadays hardly any time at all for working on Lepidoptera, and you may use any information in this letter for your report on your find to a scientific magazine."

LOUIS GRIEWISCH, 114 Gray Street, Green Bay, Wis., U. S. A.

BUTTERFLIES AND CRAB SPIDERS

Recently I happened to notice in the *Bull. Brooklyn Ent. Soc.* for 1921 (vol. 16: p. 97) E. L. BELL'S observation of a specimen of *Epargyreus tityrus* (now = *E. clarus)* apparently perched unnaturally on a red clover flower, where it was subsequently found to be dead and in the grasp of a crab spider. There may well be other records in the literature of captures of butterflies by non-webspinning spiders, and I would add this note on three species found in such situations.

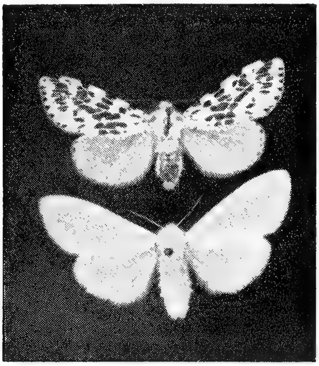
My only specimen, as it happens, of *Ancyloxipha numitor* Fab. taken during nine seasons of collecting in Emmet County, Michigan, was found on July 8, 1946, along the gravelly shore of the Straits of Mackinac west of Mackinaw City, where it was first observed in a natural enough position on the common Ox-eye Daisy (*Chrysanthemum leucanthemum* var. *pinnatifidum).* Closer examination showed it to be dead and still clutched by a small crab spider.

On August 26, 1952, collecting at Carlisle, Cumberland Co., Pennsylvania, I took two dead butterflies from spiders on Goldenrod *(Solidago sp.).* These were *Libytheana bachmanii* Kirt. and a ♀ *Polites mystic* Scud.

All three of these butterflies were in good fresh condition (could it be that they had recently emerged before capture?). In all three cases the spider appeared to human eyes to be well camouflaged — white on the white ray flowers ("petals") of the daisy and yellow on the Goldenrod. What might investigation into the ultraviolet vision of butterflies and "camouflage" effectiveness of these spiders indicate? As we raise these questions, we may repeat with further emphasis the amazement expressed in BELL'S note that such strong-flying butterflies should be the victims of capture.

EDWARD G. VOSS, Department of Botany,
University of Michigan, Ann Arbor, Mich., U. S. A.

THE FALL WEBWORM *(HYPHANTRIA CUNEA)* IN EUROPE



Hyphantria cunea from southern Slovakia. Above, spring generation ♂; below, summer generation ♀. (Photo D. Weiss.)

About ten years ago a species of Lepidoptera new in the European fauna—*Hyphantria cunea* Drury (Arctiidae)—was discovered in the immediate vicinity of Budapest. Having no enemies in the new environment the Fall Webworm soon became a feared pest threatening especially fruit-growing and sericulture. It is spreading rapidly throughout the whole of Central Europe; it has been found not only in Hungary but also in Czechoslovakia, Austria, Yugoslavia, Rumania, and is penetrating with considerable rapidity farther to the southeast and southwest. In a northern direction it has reached the frontiers of Poland. Recently this species was introduced also into Japan. In recent years several dozens of studies and reports have been published in the European literature on this new species in Central Europe.

JOSEF MOUCHA, Institute of Zoology, Charles IV. University, Praha, CZECHOSLOVAKIA

PREDATORS OF *VANESSA CARDUI*

Vanessa cardui wings: Painted Lady Butterfly wings frequently are broken off and left when small birds and lizards eat the bodies of this common migratory insect. Such wings frequently were found in summer and fall in Beet Leafhopper, *Circulifer tenellus* (Baker), breeding areas in Tooele and less frequently in Box Elder County, Utah, between 1928 and 1936. On several occasions the writer jotted down notes on the frequency with which he encountered sets of wings only of *Vanessa cardui* L. Such snipped-off wings were found most commonly near Dolomite and Timpie, in upper Skull Valley, and from Timpie west to Low, in Tooele County. On one occasion south of Timpie a Sagebrush Swift (lizard), *Sceloporus graciosus graciosus* (B.-G.), was observed to capture a winged Painted Lady Butterfly. The lizard beat its prey briskly against the ground, breaking off the wings, after which the body of the butterfly was swallowed. In this case the wings were conspicuously damaged. On another occasion a Song Sparrow *(Melospiza melodia* L.) was observed to capture a *V. cardui* and eat the body, after neatly breaking off its wings near their bases. These wings remained in rather good condition. Many wings found were lying on or near rocks, or were on other roosts. Usually these wings were much less damaged than the ones broken off by the feeding lizard. Most of the wings thus found were believed to have been left by feeding birds.

G. F. KNOWLTON, State Agricultural College, Logan, Utah, U. S. A.

REARING *SPEYERIA* IN CAPTIVITY

During the summer of 1951 I was able to secure plenty of worn females of *Speyeria hydaspe* Bdv., and a few of *S. zerene* Bdv. *S. hydaspe* females did not oviposit very readily in captivity, but I had so many that eventually I secured a fair lot of ova. The *S. zerene* were more accomodating. Neither species showed any particular preference in settling on a spot for oviposition, not even the presence or absence of the food plant seemed to make any difference. Ova were placed on leaves of violets sometimes, as often on the leaves of other plants, much more frequently on the glass walls of cages, or in moss and debris at the bottom.

The hatching times of the two species are quite different. *S. hydaspe* ova hatched two or three weeks after being deposited. *S. zerene* larvae did not come out until February, from eggs laid in September and late August.

I kept my *S. hydaspe* larvae outdoors. None survived the winter, I think most were dead a few weeks after hatching. None of them did any feeding. Dessication may be the trouble, but it seems that they would be very difficult to keep through the winter.

The first three *S. zerene* larvae, which hatched early in February, I moved at once to a small plastic vial on a shelf in my kitchen. The small amount of trouble I expended on these caterpillars, can be judged by the fact that no other member of the household ever knew what was in the vial. The larvae fed vigorously from the start, being supplied with one leaf at a time from cultivated viola plants in my garden. When they became too large for the vial, they were moved to a larger container in a sunny window. About this point two of them died. The third pupated, and a slightly undersized female butterfly emerged early in May. The normal flight period for the species is August.

The remaining larvae I moved indoors soon after the first three, but due to their number, I could not keep them in so warm a place. Also as the violas were getting somewhat heavily pruned, I switched them to pansies. I would guess that the temperature in which these larvae were kept was higher, especially at night, than would be normal outside in May and June. Still they fed little, and grew very slowly. By the end of May they seemed about fully grown. As I then had to leave them for a month, and preferred to have the butterflies emerge while I was around, I moved them away from artificial heat. I sleeved them on a large root of pansies, expecting they would soon pupate. On my return I was informed that they had eaten the pansy to the ground before pupating. All the pupae died without transforming.

The result of my experiment at least indicates that *S. zerene* can be easily forced with artificial heat, probably with better chance of success than if left to develop naturally. My failure can be attributed to two factors: a poor rearing cage, and in the case of the later lot, removal from the artificial heat, at a stage when the larvae should have been experiencing steadily increasing temperature. No doubt the failure of the food supply did them no good, but in such cases, some sort of undersized imagines usually result.

RICHARD GUPPY, R. R. 1, Marine Drive, Wellington, V. I., B. C., CANADA

ERRATUM

On page 99, Vol. 4 [1951], the hesperiid recorded as *Atrytone "arogos"* has been submitted to Dr. T. N. FREEMAN for confirmation and found to be *Adopoea lineola.* Mr. BAILEY finds this introduced European species extremely abundant near St. Catherines, Ontario.

THE SIBLING SPECIES OF BUDWORM MOTHS IN CANADA

The entire April, 1953, issue of *The Canadian Entomologist* is devoted to papers on the Spruce and Jack Pine Budworms. These six contributions constitute together a superb exposition of the biological details of the differences and similarities of these extremely closely related species. In the first paper Dr. FREEMAN describes and names the Jack Pine species as *Choristoneura pinus* sp.n. and discusses the existence of several other possible "cryptic species" of *Choristoneura* feeding on conifers in Canada and the northern and western U. S. A. Eighteen specimens of *C. pinus* and its sibling, *C. fumiferana,* are beautifully figured in color. There are identification differences of ground-color, wing-pattern, size, and ♂ genitalia; for each there is probably some overlap. Miss COX analyzes genitalic and larval differences in terms of frequency distribution in the third article.

In the second paper Miss MACKAY shows, with fine figures, the larval differences between the two species. These seem to be more absolutely characteristic than the adult differences.

Mr. CAMPBELL shows color differences in the pupa (with color photographs) and in the egg-clusters. *C. pinus* lays an average of 37 eggs per cluster; the average for *C. fumiferana* is 19.

The most remarkable discoveries by this Canadian group are analyzed by Dr. SMITH. The distinctness of the two *Choristoneura* is maintained, in the many areas where the ranges meet, by inherited reproductive isolation. *C. fumiferana* larvae feed on Balsam Fir, Black and White Spruce, and Larch; *C. pinus* feeds almost solely on Jack Pine. The eclosion periods (28 June - 13 July and 11 July - 28 July) of the two species hardly overlap, and *C. fumiferana* copulates slightly earlier in the day, so that temporal isolation is nearly complete. Mate-choice tests in cages show that each species strongly prefers to mate with its own species. No notable sterility appeared in the hybrid eggs, but eggs laid by hybrid ♀♀ showed as much as 25% sterility, due presumably to chromosomal differences. Dr. SMITH makes an apparently unwarranted statement that hybrid inviability does not operate "in preventing the flow of genes between these two species of *Choristoneura.*" Even with full fertility and fecundity, if the foodplant suitability is as exclusive as is stated, the hybrid larvae would be expected to have some combinations of nutrition genes giving reduced survival. One aspect of this cooperative study of *Choristoneura* siblings about which one would like particularly to know more is the matter of comparative nutritional physiology. Dr. SMITH'S footnote 6 suggests that tolerance of either species and their hybrids to Jack Pine has not been tested in the laboratory. It seems possible that 1) F_2 and backcross sterility due to the chromosomal differences and 2) nutritional inviability of hybrids are the most important factors causing separation of these two *Choristoneura* populations as species and that these arose during former geographic isolation. It may be that mate-choice, oviposition-plant selection, and temporal isolation arose after the populations again became sympatric and were then strongly favored by natural selection. There seems to be no evidence against such a neo-Darwinian interpretation.

The final paper, by Dr. WALLEY, lists the 13 parasitic Hymenoptera known to have *C. pinus* as a host, 9 of which were also known from *C. fumiferana.*

These papers place the two *Choristoneura* in the literature beside *Mitoura hesseli* and *gryneus, Colias australis* and *hyale, Strymon caryaevorus* and *falacer, Hyalophora angulifera* and *promethea,* and other foodplant-based complexes of sibling species of Lepidoptera which provide important information on the origin of species.

The papers on *Choristoneura* under review are as follows:

1. Freeman, T. N., "The Spruce Budworm, *Choristoneura fumiferana* (Clem.) and an allied new species on pine." *Can. Ent.* 85: 121-127, 22 figs.
2. MacKay, Margaret R., "The larvae of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free." *Can. Ent.* 85: 128-133, 14 figs.
3. Campbell, I. M., "Morphological differences between the pupae and egg clusters of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free." *Can. Ent.* 85: 134-135, 6 figs.
4. Cox, Constance E., "Analysis of frequency distribution of adults and larvae of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free." *Can. Ent.* 85: 136-141, 4 figs.
5. Smith, Stanley G., "Reproductive isolation and the integrity of two sympatric species of *Choristoneura.*" *Can. Ent.* 85: 141-151, 1 fig.
6. Walley, G. Stuart, "Hymenopterous parasites of *Choristoneura pinus* Free. in Canada." *Can. Ent.* 85: 152.

C. L. REMINGTON, Osborn Zoological Lab.,
Yale University, New Haven 11, Conn., U. S. A.

The Entomologists' Gazette commenced publication in 1950 (Vol. 1). The emphasis is on British Lepidoptera, but other orders of insects are regularly represented in its pages. The *Gazette* is a quarterly, published in January, April, July, and October. The Editor is the entomological bookseller and publisher, E. W. CLASSEY, and the Assistant Editor is H. S. ROBINSON. The annual subscription rate is one pound. The address is 91 Belfont Lane, Feltham, Middlesex, England.

C. L. R.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [Y.O.] - Y. OKADA; [C.R.] - C.L. REMINGTON; [J.R.] - J.E. REMINGTON; [T.S.] - T. SHIRÔZU. **A complete set of these pages for clipping and filing may be obtained for Vols. 4, 5, 6, and 7 for $ 0.50 per volume.**

B. SYSTEMATICS AND NOMENCLATURE

Burnett, Douglass, "Can you identify fabric pests? Part one - the clothes moth." *Pests and Their Control,* vol. 18, no. 11: pp. 9-11, 18, 5 figs. Nov. 1950. Appearance and habits of 3 spp. described. [P.B.]

Gregor, František, & Dalibor Povolny, "Sur quelques lépidoptères intêressants de la Tchecoslovaquie" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 47: pp. 166-168, 3 figs. 1 Oct. 1950. Records 22 spp. Figures ♂ genitalia of *Pygolopha lugubrana, Topeutis barbella,* and *T. criella.* [P.B]

Henriot, R., "Quelques observations sur trois espèces françaises du groupe de *Cryphia* (*Bryophila*) *algae* F." [in French]. *Rev. Franç. Lepid.,* vol. 12: pp. 99-101. "May-June" [7 Dec.] 1949.

Vari, L., "Nederlandse Lepidoptera 5^e faunistische mededeling" [in Dutch]. *Ent. Berichten,* vol. 13: pp. 180-184, 193-198, 18 figs. 1 Dec. 1950, 1 Jan. 1951. Discusses 18 spp. of Microlepidoptera - 12 are new for the Dutch fauna; gives figures of genitalia and of mine-galleries; adds synonymy of 18 spp. [A.D.]

E. DISTRIBUTION AND PHENOLOGY

Blackie, J.E.H., "The range and distribution of *Agapetes galathea* L." *Entomologist,* vol. 84: pp. 132-135. June 1951. More local in England than would be expected. Raises questions as to possible bearing of larval dimorphism, mite parasites of adult, and oviposition habits on this distribution. [P.B]

Bourgogne, Jean, "*Pieris manni* existe-t-il dans la région parisienne?" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 19-20. "Jan.-Feb." [31 Mar.] 1951.

Burgeff, H., "Die Meeralpengrenze der Zygaenen (Lep.), eine mit Hilfe der Populationsanalyse der Arten der Gattung *Zygaena* (Lepidoptera) durchgeführte Untersuchung über die Lokalisation und die Bedeutung geographischer Rassen in ihrem Zusammenhang mit der Eiszeit" [in German]. *Biol. Zbl.,* vol. 70: pp. 1-23, 14 figs. 1951. The range of some species of *Zygaena* is bounded on either the East or the West by the region where the southern Alps meet the Mediterranean. The author explains this distribution, and the geographic variation in species not so limited, in terms of the glacial history of the area. [P.B.]

Freeman, T. N., "Northern Canada and some northern butterflies." *Lep. News,* vol. 5: pp. 41-42, 1 fig. 1951.

Harris, Lucien, Jr., "Notes and range extensions of butterflies in Georgia." *Lep. News,* vol. 4: pp. 43-44. "1950" [Jan. 1951].

Judd, W.W., "*Acentropus niveus* (Oliv.) (Lepidoptera: Pyralidae) on the north shore of Lake Erie with a consideration of its distribution in North America." *Canad. Ent.,* vol. 82: pp. 250-252, 2 maps. Dec. 1950. Species occurs in lower Great Lakes and St. Lawrence River region; probably native. Food plant *Ceratophyllum.* [P.B.]

Le Marchand, S., "Une belle capture" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 232-233. "Mar.-Apr." [25 Sept.] 1950. Notes on the giant micro *Atremaea lonchoptera.* [P.B.]

Munro, J. A., & Wayne J. Colberg, "European Corn Borer occurrences in North Dakota." *80th Ann. Rep. Ent. Soc. Ontario*: pp. 20-21. 1950. *Pyrausta nubilalis.*

Munroe, Eugene, "The occurrence of a butterfly in the Pribilof Islands." *Lep. News,* vol. 4: p. 44. "1950" [Jan. 1951].

Norman, T., "Where do butterflies go?" *Journ. Bombay Nat. Hist. Soc.,* vol. 49: pp. 566-568. Dec. 1950. Comments on the causes of variation in seasonal abundance of tropical butterflies. [P.B.]

Picard, J., "Repartition de *Heteropterus morpheus* Pallas en Europe" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 149-152, 1 map. "Sept.-Oct. 1949" [25 Jan. 1950]. Figures present scattered occurrence and speculates on causes of this distribution. [P.B.]

Reid, W., "Records of moth trap in Sheffield, 1950." *Entomologist,* vol. 48: pp. 78-82. Apr. 1951. Records of atmospheric conditions and captures over a 3 month period. [P.B.]

Suranyi, Paul, "Ein neuer Schadling in Europa (*Hyphantria cunea* Drury)" [in German]. *Proc. VIII Int. Ent. Congr.,* pp. 687-692, 4 figs. 1950. Biology of this North American sp., recently established in Hungary. [P.B.]

Toxopeus, L. J., "Java in Sumatra (Lepidoptera)" [in Dutch]. *Idea,* vol. 8: pp. 102-103. 31 Jan. 1951. Discusses great convergence of Rhopalocera of Kalianda region in S. Sumatra with fauna of Java. [A.D.]

Urbahn, Ernst, "Beobachtungen auf Rügen 1943-45 (Eine Ergänzung zur "Pommernfauna")" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 11-21, 1 pl., 2 maps. 1 May 1950. Discusses various ecological divisions of the area and their fauna. [P.B.]

F. BIOLOGY AND IMMATURE STAGES

Benoit, P. L. G., "Contribution à l'étude de la faune parasitaire de *Sylepta derogata* Fabricius (Lepid. Pyral.) au Congo Belge" [in French]. *Bull. Ann. Soc. Ent. Belg.,* vol. 86: pp. 87-103. 6 May 1950. Describes the biology of 2 *Apanteles* spp. [P.B.]

Bergold, G. H., "The polyhedral disease of the Spruce Budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae)" *Canad. Journ. Zool.,* vol. 29: pp. 17-23, 3 pls. Feb. 1951.

Blunck, H., "Zur Kenntnis der Hyperparasiten von *Pieris brassicae* L. 3. Beitrag: *Hermitels simillimus* Taschb. nov. var. *sulcatus.* Kennzeichen und Verhalten der Vollkerfe" [in German]. *Zeits. Angew. Ent.,* vol. 32: pp. 335-405, 15 figs. May 1951.

Bovey, Paul, "Le carpocapse des pommes *Enarmonia pomonella* (L.), ravageur important des abricots en Valais (Suisses)" [in French]. *Proc. VIII Int. Ent. Congr.,* pp. 601-608, 6 figs. 1950. Biology and control. [P.B.]

Breakey, E. P., "Natural control of the Orange Tortrix in western Washington." *Journ. Econ. Ent.,* vol. 44: p. 424. June 1951. Parasites of *Argyrotaenia citrana.* [P.B.]

Candura, G. S., "Reperti su la *Sitotroga cerealella* Oliv. nell' Italia settentrionale e su altre tignole dei viveri" [in Italian]. *Boll. Zool. Agr. Bachic.,* vol. 16: pp. 99-146, 6 figs. 1950. Describes and figures all stages and discusses biology. [P.B.]

Chace, Lynwood M., "A Cecropia moth emerges." *Natural History,* vol. 59: pp. 446-449, 9 figs. Dec. 1950. All pictures, which are excellent. [P.B.]

Chiaromonte, A., "L'*Achaea catella* Guen. nella Somalia Italiana" [in Italian, English summary]. *Proc. VIII Int. Ent. Congr.,* pp. 616-631, 3 figs. 1950. Discusses biology of this sp., destructive to castor plants, and of some relatives. [P.B.]

Cleu, H., "La vie larvaire de *Derthisa scoriacea* Esp." [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 319-320. "Sept.-Oct." [10 Dec.] 1950. Food plants *Anthericum* and *Narcissus.* [P.B.]

Couturier, A., "La teigne de la betterave en France (*Phthorimaea ocellatella* Boyd. Lepid. Gelechiidae)" [in French]. *Proc. VIII Int. Ent. Congr.,* pp. 632-636. 1950. Biology, parasites, control. [P.B.]

Diakonoff, A., "Varensporangien als biotoop voor Microlepidoptera" [in Dutch: Sporangia of ferns as a biotope for Microlepidoptera]. *Idea,* vol. 8: pp. 99-100. 31 Jan. 1951.

Docters van Leeuwen, W. M., "Zoocecidia van het eiland Terschelling, 2e mededeling" [in Dutch]. *Ent. Berichten,* vol. 13: pp. 168-173. 1 Nov. 1950. Records 3 galls caused by Lepidoptera. [A.D.]

Docters van Leeuwen, W. M., "Kweek van *Macrothylacia*" [In Dutch: Rearing of M.]. *Ent. Berichten,* vol. 13: pp. 30-31. 1 Dec. 1951.

Dowden, Philip B., & V. M. Carolin, "Natural control factors affecting the Spruce Budworm in the Adirondacks during 1946-1948." *Journ. Econ. Ent.,* vol. 43: pp. 774-783. Dec. 1950. Parasites of *Archips fumiferana.* [P.B.]

Dresner, Edgar, "The toxic effect of *Beauveria bassiana* (Bals.) Vuill. on insects." *Journ. N.Y. Ent. Soc.*, vol. 58: pp. 269-278. 19 Feb. 1951. Experiments on *Phthorimaea operculella* etc. [P.B.]

El Zoheiry, M. S., "*Heliothis nubigera* H.-S. (Lepidoptera- Noctuidae), a new pest of watermelons in Egypt." *Proc. VIII Int. Ent. Congr.*, pp. 732-736, 4 figs. 1950. Biology and control. [P.B.]

Flock, R.A., "Damage to household goods by Fan Palm Caterpillar." *Journ. Econ. Ent.*, vol. 44: pp. 260-261. Apr. 1951. *Litoprosopus coachellae;* larvae feed on *Washingtonia* spp.; damage carpets etc. in collecting material for cocoon. [P.B.]

Foltin, Hans, "Biologische Beobachtungen aus Oberösterreich" [in German]. *Z. Wiener Ent. Ges.*, vol. 62: pp. 12-16. 15 Apr. 1951. Biological notes on *Lycaena cyllarus, Lophopteryx camelina, Hypena obesalis, Zygaena filipendulae, Miana ophiogramma, Hadena scolopacina.* [P.B.]

Foltin, Hans, "Etwas über die Biologie von *Lasiocampa quercus* L." [in German]. *Z. Wiener Ent. Ges.*, vol. 62: pp. 52-54. 30 June 1951.

Fraser, A. G. L., "A butterfly (*Catopsilia crocale*) with a defect in right hind wing." *Journ. Bombay Nat. Hist. Soc.*, vol. 49: pp. 797-799. Apr. 1951. Fungus growing on living wing. [P.B.]

Fullaway, D. T., "Description of a *Brachymeria* parasitic on *Agonoxena argaula* Meyr. in Samoa." *Proc. Hawaiian Ent. Soc.*, vol. 14: pp. 63-64. Mar. 1950.

Gaillard, R., "Complément à l'étude de H. Beuret sur les *Plebeius argus* de Nîmes" [in French]. *Rev. Franç. Lépid.*, vol. 12: p. 281. "May-June" [11 Dec.] 1950. Food plants: *P. argus, Lotus tenuis, Onobrychis supina; Lysandra escheri splendens, Astragalus monspessulanus.* [P.B.]

Gaines, J. C., and H. J. Reinhard, "A sweet clover borer in Texas." *Journ. Econ. Ent.*, vol. 44: pp. 623-624, 1 fig. Aug. 1951. *Walshia amorphella;* also on *Melilotus alba.* [P.B.]

Gómez Clemente, Federico, "Estudios de lucha natural contra *Earias insulana*" [in Spanish]. *Bol. Patol. Veg. Ent. Agric.*, vol. 17: pp. 83-95, 7 figs. 1950. Biology of the braconid parasite *Rhogas aligarhensis,* with notes on some other parasites. [P.B.]

Haggett, G., "Further observations on *Zeuzera pyrina* L." *Entomologist,* vol. 84: pp. 31-33. Feb. 1951. Habits, variation, distribution. [P.B.]

Haggett, G., "*Eupithecia intricata* Zett. f. *arceuthata* Frr. (Lep., Geometridae)." *Entomologist,* vol. 84: pp. 58-60. March 1951. Habits, distribution, descripton of larva; food plants *Cupressus* and *Chamaecyparis.* [P.B.]

Hamstead, Eywood O., "Codling moth oöcyte studies." *Journ. Econ. Ent.*, vol. 43: pp. 724-727. Oct. 1950. Counts of oocytes in trapped and reared ♀♀ of *Carpocapsa pomonella;* moths evidently lay more freely in nature than in capivity. [P.B]

Hardy, G. A., "Notes on the life-history of the Garry Oak Looper, *Lambdina fiscellaria somniaria* Hlst." *Proc. Ent. Soc. Brit. Columbia,* vol. 46: pp. 13-14. 15 May 1950. Describes early stages and habits. Food plant *Quercus garryana.* [P.B.]

Herbulot, C., "Troisième note sur Saint-Tropez" [in French]. *Lambillionea,* vol. 50: pp. 48-52. 25 June 1950. Records of 33 spp., with biological notes on some. [P.B.]

Hering, Erich Martin, "Die Oligophagie phytophager Insekten als Hinweis auf eine Verwandschaft der Rosaceae mit den Familien der Amentiferae" [in German]. *Proc. VIII Int. Ent. Congr.*, pp. 74-79. 1950. Gives a classification of phytophagous insects according to the number and variety of their foodplants. Lists a large number of oligophagous species (those feeding on a few plants which are not closely related) which are restricted to representatives of the Rosaceae and Amentiferae, as evidence for serological similarity and possible relationship between these groups. [P.B.]

Howden, Henry F, & Anne T., & Paul O. Richter, "Insects feeding on Poison Oak (Rhus toxicodendron L.)." *Coleop. Bull.*, vol. 5: pp. 17-19. Apr. 1951. Lists *Paectes oculatrix, Epipaschia zelleri, Episimus argutanus, Cacoecia argyrospila, Lithocolletis guttifinitella, Gracilaria rhoifoliella.* [P.B.]

Howe, W. L., "Biology and host relationships of the Squash Vine Borer." *Journ. Econ. Ent.*, vol. 43: pp. 480-483. Aug. 1950. *Melittia cucurbitae.*

Iwase, Taro, "Lessons from here and there (1)" [in Japanese]. *Butt. and Moths (Trans. Lep. Soc. Japan)*, vol. 2: p. 15. 1951. Notes on larva and pupa of *Zerynthia* [Y.O.]

Laird, Marshall, "Lepidopterous eggs and larvae from the exterior of aircraft fuselages." *Nature,* vol. 166: p. 1081. 23 Dec. 1950. Noctuid found in New Zealand on plane from Fiji. [P.B.]

Latif, Abdul, & Ch. Muhammed Yunus, "Food-plants of Citrus Leaf-Miner (*Phyllocnistis citrella* Stn.) in the Punjab." *Bull. Ent. Res.,* vol. 42: pp. 311-316. Aug. 1951. Recorded from *Citrus* spp. and *Aegle marmelos.* [P.B.]

de Lucca, C., "Notes on the biology of *Cnephasia gueneana* Duponchel (Lepidoptera: Tortricidae)." *Entomologist,* vol. 84: pp. 205-207. Sept. 1951. Describes larva; lists 8 food plants. [P.B.]

Luteršek, Dragutin, "Beitrag zur Kenntnis der Biologie des *Calosoma sycophanta* L. und *Calosoma inquisitor* L. als Feinde des Schwammspinners (*L. dispar* L.)" [in Jugoslav, German summary]. *Bull. Coll. Forestry Univ. Belgrad,* vol. 1: pp. 353-365. 1950.

Munroe, Eugene, "Field notes on the butterflies of Knob Lake, Northern Quebec." *Lep. News,* vol. 5: pp. 7-9. [June] 1951.

Pastraña, Jose & Hugo Gahan, "Cría en masa de *Macrocentrus ancylivorus* Roh., parasito natural del 'gusano del duraznero' en la Republica Argentina" [in Spanish]. *Pub. Inst. Sanidad Veg. Argentina,* series B, no. 19: 22 pp., 12 figs. 1950. Describes the technique used in mass-rearing of this parasite on *Gnorimoschema operculella.* [P.B.]

Patočka, Jan, "Quelques notices sur l'écologie d'un tortricide *Epiblema proximana* H. S. (Lep. Tortric.)" [in Czech, French summary]. *Acta Soc. Ent. Čechosloveniae,* vol. 45: pp. 89-94, 19 figs. 1 May 1948. Describes early stages; food plant fir. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Agrell, Ivar, "Pupal diapause caused by vitamin deficiency." *Nature,* vol. 167: pp. 283-284, 1 fig. 17 Feb. 1951. Injection of aneurin and pantothenic acid raises the respiratory quotient of *Endromis versicolora* pupae, indicating that temporary deficiency of these substances may produce lowered metabolism and diapause. [P.B.]

Allegret, Paul, "Influence de la rétention expérimentale de la soie sur la metamorphose de *Bombyx mori* (L.)" [in French]. *C. R. Acad. Sci.,* vol. 232: pp. 268-270. 15 Jan. 1951. Preventing the larva from emptying the silk glands causes death in the larval or pupal stage. [P.B.]

Allegret, Paul, "Retard de la nymphose chez *Galleria mellonella* L. après la sécrétion du cocon. Influence de l'alimentation" [in French]. *C. R. Acad. Sci.,* vol. 233: pp. 441-443. 30 July 1951. Delayed pupation results from abundance in food which must be excreted as silk. [P.B.]

Götz, Bruno, "Über die tageseitliche Konstanz beim Ausschlüpfen von Lepidopteren" [in German]. *Zool. Jahrb. allg. Zool.,* vol. 62: pp. 355-365, 5 figs. 5 Apr. 1951. Experiments on *Ephestia, Bombyx* and several tortricids show that these spp. eclose most frequently at certain hours, and that light and internal factors both determine this regularity. [P.B.]

Hiestand, W. A., "The resistance to nitrogen narcosis of insects, spiders, and phalangids." *Anat. Rec.,* vol. 108: p. 614. Nov. 1950. Abstract only.

H. MIGRATION

Eliot, N., "Flighting Satyridae." *Entomologist,* vol. 84: pp. 70-71. Mar. 1951. Local movement of three spp. in Cyprus. [P.B.]

Lempke, B. J., "Trekvlinders in 1950 (elfde jaarverslag)" [in Dutch: Migratory Lepidoptera in 1950, 11th annual survey]. *Ent. Berichten,* vol. 13: pp. 341-348. 1 Oct. 1951.

Nordström, Frithiof, "*Pieris brassicae* på vandring" [in Swedish, German summary]. *Ent. Tidskr.,* vol. 72: pp. 79-80. 15 Apr. 1951. Migration.

Ploeger, P. L., "Trek van *Pieris brassicae* op Texel" [in Dutch: Migration of *P. b.* in Texel Island]. *Ent. Berichten,* vol. 13: p. 254. 1 Apr. 1951.

Temple, Vere, "Immigration of *Pieris brassicae.*" *Entomologist,* vol. 84: pp. 214-215. Sept. 1951.

NOTICES

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Wish to purchase Noctuidae from all parts of the world, or will give in exchange butterflies from Italy. Dr. E. Berio, Museo di Storia Naturale, Via Brigata Liguria 9, Genova, ITALY.

A new exchange system to help collectors get common material from out-of-the-way places is being established, with lots of 100 papered specimens with *full data* to be sent to this collector.. Prompt return of exchange made. Nymphalidae esp. desirable. Write for arrangements: Raymond J. Jablonski, 1018 E. Ogden Ave., Milwaukee 2, Wis., U. S. A.

Wish to exchange California butterflies with collectors all over the world. Will offer *Euphydryas editha bayensis* in large quantity. Especially desire contacts with Africa, China, Australia and Indonesia. Will take other California species in exchange for the *E. editha bayensis.* Donald L. Baber, 1511 Drake Ave., Burlingame, Calif., U. S. A.

BOOKS FOR SALE (all new): *Butterflies of Southern Africa - Where, When and How They Fly* by D. A. Swanepoel, 1953, De Luxe Edition $14.70, Regular Edition $10.50; *Butterflies of Rhodesia* by E. C. G. Phinhey, 1949, $3.25; *Butterflies of California* by J. A. Comstock, $9.00. D. Neumann Jr., 3066 Georgia St., Oakland 2, Calif., U. S. A.

Butterflies and beetles, foreign only, largest stock in country, wholesale and retail at lowest prices. Contact with tropical collectors also desired. G. F. Schirmer, 2912 No. 45th St., Milwaukee 10, Wis., U. S. A.

Needed for research purposes: North American *Lithocolletis.* Central European Lepidoptera of all groups offered in exchange. Dr. Dalibor Povolný, 83 Havlíčkova, Brno, CZECHOSLOVAKIA.

Wish to obtain complete run of *Notes on Moths and Butterflies* (formerly *The Howell Mountain Butterfly Club),* edited by Mrs. Evelyn Gilstrap Williams. C. F. dos Passos, Washington Corners, Mendham, N. J., U. S. A.

Wanted: Specimens of all varieties of *EUCLEA* for genitalic study: imperfect specimens with abdomens accepted if determinable. Ralph Beebe, 4169 Tenth St., Ecorse 29, Mich., U. S. A.

Wish to exchange Rhopalocera and Saturniidae with collectors of the United States and foreign countries. Have eastern U. S. material for exchange, and possibly some extra *Speyeria diana* this summer, as well as *Eacles imperialis,* and *Citheronia regalis.* Charles V. Covell, Jr., Box 569, Southern Pines, N. C., U. S. A.

"Check-list of the Butterflies of Hartman, Colorado, Caught in Two Years" (mimeo) for sale at $0.25. J. M. Unseld, Jr., Gravel Switch, Ky., U. S. A.

LIVING MATERIAL

Wanted urgently: pupae of *Papilio bairdi, P. indra, P. brevicauda,* and *P. nitra.* Good prices paid or will exchange for British species. Dr. C. A. Clarke, High Close, Thorsway, Caldy, Cheshire, ENGLAND.

Wanted: cocoons of Saturniidae; pupae of *Papilio,* Sphingidae, Arctidae; fertile ova. Exchange or buy. Eugene Dluhy, 3912 No. Hamilton Ave., Chicago 18, Ill., U. S. A.

The Lepidopterists' Society has recently suffered the loss of two of its most notable members. One of the five Honorary Life Members, G. D. HALE CARPENTER, Hope Professor of Entomology Emeritus of Oxford University, died after a long illness on 30 January at the age of 70 years. He was the leading authority on mimicry and on the systematics of several groups of butterflies, particularly of Africa. W. PRESCOTT ROGERS, of Fall River, Massachusetts, died on 6 May, also following a period of illness. Mr. ROGERS concentrated his interest on the butterflies of New England. Biographical accounts of these lamented friends of the Society will appear in the *News*.

ADDITIONS TO THE MEMBERSHIP LIST

Collins, Victor C., 255 West 84th St., New York City, N. Y., U. S. A.
Dixon, Bruce, 119 Cherry Valley Rd., Pittsburgh 21, Pa., U. S. A.
Marston, Norman L., Hartman, Colo., U. S. A.
Murtaugh, Paul A., Tuxedo Park, N. Y., U. S. A.
Nakayama, Masaki, 1-398 Fujihonmachi, Wakamatsu-city, Fukuoka-prefecture, Kyushu, JAPAN.
Oemick, Donald, 11022 Vernon Ave., Chicago 20, Ill., U. S. A.
Parodi, Guiseppe, via Sebenico 13, Milano, ITALY.
PATTERSON, DONALD, 170 Glenwood Ave., Atherton, Calif., U. S. A.
Pirone, Dominick J., 108 No. Columbus Ave., Mt. Vernon, N. Y., U. S. A.
Polusny, John, 185 Magnus Ave., Winnipeg, Man., CANADA.
Powell, Jerry A., 4170 Bedford Drive, San Diego 16, Calif., U. S. A.
Rees, William A., 934 So. McDonnell Ave., Los Angeles 22, Calif., U. S. A.
Wright, William J., Box 86, Cottonwood, Arizona, U. S. A.

The authors have sent to the *Lepid. News* office a supply of two valuable papers on early stages of Lycaenidae. A copy will be forwarded to each Society member requesting one or both and enclosing 5¢ in postage stamps (members outside of the U. S. A. do not need to send the stamps). The papers are:

1. Rawson & Hessel, "The life history of *Strymon cecrops* Fabricius." *Bull. Brooklyn Ent. Soc.* 46: pp. 79-84, 5 figs. 1951.

2. Rawson, Ziegler, & Hessel, "The immature stages of *Mitoura hesseli* Rawson & Ziegler." *Bull. Brooklyn Ent. Soc.* 46: pp. 123-130, 3 figs. 1951.

THE LEPIDOPTERISTS' SOCIETY

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The object of The Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

Active Members - annual dues \$3.00 (U. S. A.)
Sustaining Members - annual dues \$5.00 (U. S. A.)
Life Members - single sum \$50.00 (U. S. A.).

Each year a list of all members of the Society is published, with addresses and special interests. The list is sent to all members.

All members are expected to vote for officers when mail ballots are distributed by the Secretary each year.

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The LEPIDOPTERISTS' NEWS

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In This Issue

(complete contents on back cover)

5 November 1953

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.*, mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.*, personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; Latin names of genera and species will be italicized, and authors of such Latin names WILL NOT APPEAR IN THE TITLE of any paper. The style should conform to that used in recent issues of the *News*. Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

At least 25 gratis reprints will be provided to authors if requested at the time galley proof is received for correction. Additional reprints and covers may be ordered at cost, at the same time.

Address editorial correspondence to: Dr. C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U. S. A.

Address Society correspondence to: Dr. F. H. RINDGE, Dept. of Insects & Spiders, American Museum of Natural History, New York 24, N. Y., U. S. A.

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THE LEPIDOPTERISTS' NEWS

Volume 7 1953 Numbers 3-4

MARKED LEPIDOPTERA RECOVERED

Information is urgently needed from all individuals who have been marking Lepidoptera and releasing them in North America during the past five years. Two moths, apparently deliberately marked by distinctive perforations in the wing, have been taken in 1953 and reported to the *News* editor.

No response was ever received from the releaser of a clearly marked specimen of *Anaea andria* (the Goatweed Butterfly) which was recovered in Kansas in 1948 and is now at Yale University.

Any reader of the *News* who recovers a definitely or probably marked moth or butterfly, or who marks and releases specimens, is urged to keep the *News* editor fully informed and preferably to send him sample specimens.

CHECK-LIST OF LEPIDOPTERA OF FLORIDA

C. P. KIMBALL is assembling material for a new check-list of the Lepidoptera of Florida. He reports a fine response to his questionnaire on Florida Lepidoptera and is most appreciative of the generous offers of assistance in supplying information. The questionnaires were sent out only to those members of the Society whose interests as stated in the annual membership list indicated that there might be Florida material in the collections. If anyone who has such material did not receive the questionnaire, it would be appreciated, if he or she would communicate that fact to Mr. KIMBALL, whose address is: Rt. 4, Box 942, Sarasota, Fla., U. S. A.

DYSSTROMA BEING REVISED

DOUGLAS C. FERGUSON requests, for revisional study, North American Geometridae of the genus *Dysstroma,* especially of the *D. truncata - walkerata* complex. He will work up and return material sent on loan, or will offer good exchange for desirable duplicates. His address is: Nova Scotia Museum of Science, Halifax, N. S., CANADA.

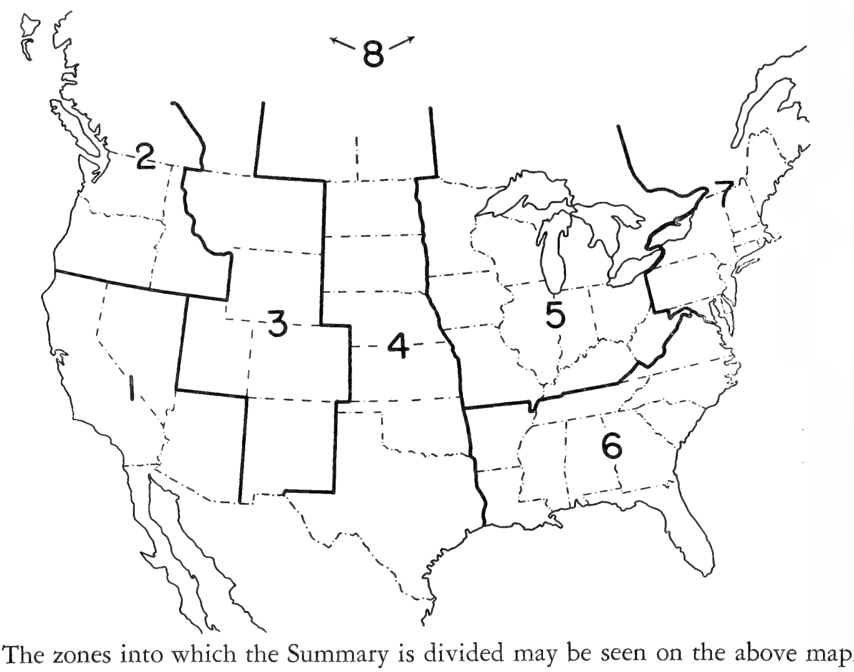
C. L. REMINGTON, Yale University, New Haven 11, Conn., U. S. A.

THE FIELD SEASON SUMMARY OF NORTH AMERICAN LEPIDOPTERA FOR 1952

No pronounced pattern is obvious in the reports of Lepidoptera abundance for 1952. In general, collecting seems to have been good, but there were summer droughts and attendant scarcity of butterflies in several regions. The principal migrant in a year of large migrations appears to have been *Vanessa cardui* in both east and west, though there are comparatively restricted reports for a few areas. This was clearly a big year for *V. cardui,* the first since 1949. Records of 1952 migrations of *V. carye, Nymphalis californica, Celerio lineata,* and *Ascia monuste* appeared in *The Lepidopterists' News,* vol. 7: nos. 1, 2.

PROCEDURES IN SUMMARIZING

The usual practices of the preceding Summaries have been followed, to ensure clarity and uniformity. Subspecific names are in general omitted except where they may be of distributional significance, or where several subspecies may occur in a limited area. Authors' names are omitted after species names. The nomenclature in general follows Klots' *A Field Guide to the Butterflies* (1951) for the eastern butterflies, with names of western butterflies harmonized so far as reasonably possible. The nomenclature of the moths follows the arrangement of the Canadian National Collection, which is based on McDunnough's *Check List of the Lepidoptera of Canada and the United States of America* (1938-39), with revisions indicated by more recent work.



The zones into which the Summary is divided may be seen on the above map.

EUGENE G. MUNROE
Associate Editor for the Season Summary

1. SOUTHWEST — CALIFORNIA, ARIZONA, NEVADA

by Lloyd M. Martin

In spite of the large number of collectors in this area only a few found it possible to contribute this year. For this reason it seems best to let the individual reports speak for themselves.

A widespread migration of *Vanessa cardui* seems to have been the most conspicuous event in the area.

CALIFORNIA

F. T. Thorne reports as follows from the SAN DIEGO REGION:
Weather: The first half of 1952 was characterized by exceptionally heavy rainfall with over 4 inches in January, almost 5 inches in March yet February would have been rainless if there had not been 29 days this year. During the first six months rainfall was 50% above normal, but during the last six months only slightly so. Temperatures generally averaged above normal, during February, May and September, exceptionally so. Sunshine, due to so much rainy weather, averaged below normal for the year. Rainfall late in 1951 was good, but for the whole year was woefully deficient, so that the drought condition preceded 1952.

The whole season was delayed by wet weather, and while poor weather reduced the opportunities to collect, the opinion is that population levels failed to respond immediately following a prolonged drought cycle. Desert collecting was poor before the end of March. Coastal flights peaked about May 11; mountain spring flights in May were below normal. Collecting during the year throughout the county was disappointing.

There was little evidence that parasites or predators were responsible for the lack of large numbers of many species. Larvae were generally hard to find, but this is considered a product of low populations rather than biological controls.

Two exceptional migrations were recorded during 1952. On February 10, at El Cajon a strong north-northeast flight of *Vanessa cardui* was first observed. Sample counts gave an estimate of 750 per minute per mile front. Specimens were faded but not frayed, and dissection showed 60% females and 40% males. There appeared to be a fresh non-migration resident population of this species of about 5%. Air temperature between 1 and 2 p.m. was 61°F. This same flight was reported from Fallbrook 48 miles northwest on February 14. In Canebrake Canyon in the desert due east of the Laguna Mountains the flight was heavy on February 12 and was in a west by northwesterly direction. Past one favorable thirty foot strip, a rate of 1000 per hour was clocked; activity began about 9 a.m. but by mid-afternoon migration stopped, and the butterflies fed or rested. A dissected sample showed 57% males and 43% females. They were faded and worn but only a few tattered. On February 24 at El Cajon a rate of 690 per hour was clocked past a 40 foot strip—the direction the same as

on February 10, north-northeast. By March 3 the flight was practically over. Flight was not continuous during the period due to rainy or cool weather. The mountain country seemed to be avoided in the main, because of adverse temperatures.

On June 4, near Julian, a strong flight of fresh *Nymphalis californica* was seen around 9 a.m. going in an easterly direction. This same flight occurred elsewhere throughout the county including Borrego Valley. Time did not permit a study of rates, etc. On June 8, the first opportunity to collect, the flight had dropped to a very low level. Larvae never did appear to any extent on *Ceanothus* following this flight. *Danaus plexippus* was not observed in any marked migratory movement during the year. *Malacosoma americana* became epidemic during May and caused defoliation of Scrub Oak, Live Oak, and other natives in the foothill and mountain areas. *Celerio lineata* larvae in response to lush desert vegetation, reached serious proportions in April on the desert and were destructive to native vegetation and grapes. A month later they were a nuisance in San Diego and other coastal areas.

SPECIFIC NOTES: *Anthocaris cethura,* ordinarily local and rare, was common in the foothill areas throughout March. *A. lanceolata* was unusually numerous in Box Canyon March 25, flying with *A. cethura. Melitaea chara* was taken at 6000 ft. in the Laguna mountains on May 2, where it had probably wandered from the desert. *Speyeria callippe* was exceptionally abundant near Jamul on May 29 and June 3. Larvae of *Papilio pergamus* starved to death rather than eat four species of Umbelliferae other than *Velea arguta. Zerene cesonia* enjoyed an exceptionally good year in desert and mountain areas. A mature parasitized larva of *Mitoura spinetorum* was found July 16 on pine mistletoe at 6000 ft. on Warners Spring Mountain. *Agraulis vanillae* suffered during the wet winter and didn't become normally common until August. *Nathalis iole* continues to be commoner than formerly. *Euphydryas editha wrightii* was well below normal levels.

Notes from JERRY POWELL. One *Melitaea neumoegeni* was taken April 8 in Box Canyon. This is a rarity in San Diego County. *Chlosyne californica* was taken at Warners Hot Springs June 5, out of its usual desert areas. One *Papilio philenor* was taken on Monument Peak, Laguna mountains June 18. *Colias harfordi* was taken in San Diego City, June 13. *Strymon spadix* was taken in several mountain localities June 5 to July 10.

J. W. TILDEN gives the following report from the SAN JOSÉ REGION:

The fall of 1951 was relatively warm and open, with less-than-normal rainfall, nearly to Thanksgiving. Thereafter, for the remainder of the 1951-1952 winter, there was more than a usual amount of stormy and cold weather. Rain came in large storms, accompanied in several cases by high winds. Rainfall passed normal. January was characterized by almost continuously rainy weather, with little or no sunshine. Snow in unusual amounts fell on the mountains on both sides of the Santa Clara Valley and Mt. Hamilton was snow-capped for long periods of time. Frosts were heavy on the valley floor. On March 1, 1952, rainfall was over 14 inches, more than four inches above normal for that time.

As a result, early collecting was not found. The February insects were reduced in flying days by the lack of sunshine, but Mr. SMOKER found

Anthocaris sara reakirtii and *Philotes sonorensis* on February 10 in Alum Rock Park. Also overwintering *Nymphalis antiopa* were seen.

On March 14 a heavy storm blew in and hampered collecting for nearly two weeks. After March 21 the weather became clear but was cold until near the end of March. Thereafter the weather became about normally warm and the rest of the season proceeded about normally.

On March 21, conditions were cold and clear with considerable wind at Simmler, San Luis Obispo County, and no *Mitoura siva* were found. *Anthocaris sara* was the only butterfly seen.

On March 28, conditions were good in Alum Rock Park, with about the usual number of species and individuals: *Papilio zelicaon* and *P. rutulus; Pieris rapae, napi,* and *occidentalis; Coenonympha california; Plebeius acmon; Glaucopsyche lygdamus; Philotes sonorensis; Lycaenopsis argiolus;* and the moths *Annaphila decia, A. diva, Epirrhoe plebeculata,* and *Hydriomena* spp.

March 31, Stevens Creek area, conditions were cold and bleak with little flying: *Anthocaris sara, Lycaenopsis pseudargiolus, Annaphila deva* and *decia.*

April 4, between Mojave and Essex in the Mojave Desert, conditions seemed early with little flying except enormous numbers of *Vanessa cardui,* which seemed to be migrating. They were moving into the northerly wind and differed in concentration in different parts of the area, but on the average, driving along the road, five or six were in sight at a time, crossing the road at a rate of one every two or three seconds. The total numbers present on the desert must have been many millions. Between Mojave and Essex is a distance of about 180 miles, so it is seen that this was a movement of very considerable scope.

April 5, Providence Mts.: The trip was made in hope of finding *Callophrys comstocki* and *Incisalia fotis,* but only one of the former was seen, none of either taken. Butterflies seemed very scarce although the general conditions were good. Since there have been several dry years, it may take more than one wet year for the populations to build up again. Species and individuals were few: *Papilio bairdii, Pieris occidentalis, Anthocaris cethura, Euchloe creusa, Euphydryas* (probably *chalcedona* form?), *Melitaea neumoegeni, Vanessa cardui, Pyrgus communis.*

April 6, near Simmler, conditions were still apparently early and cold. *Vanessa cardui* (old overwintered insects as in the Mojave migration), *Mitoura siva* (2 males only), *Xanthothrix neumoegeni, Heliosea fasciata* (1), and a few *Alypia ridingsi.*

April 16, Alum Rock Park, conditions still retarded: *Papilio rutulus, P. zelicaon, Euchloe ausonides, Anthocaris sara reakirtii, Pyrgus communis, Glaucopsyche lygdamus, Plebeius acmon, Leptarctia calforniae,* all scarce.

On April 26-27 at La Panza Camp Ground, near Simmler, San Luis Obispo County, it rained lightly both mornings and evenings and was cool and partly cloudy with high winds in the afternoons. No butterflies were seen except the by now very monotonous *Vanessa cardui,* which is the only

common butterfly this season in most localities. Larvae of this species were abundant on *Amsinckia.* Several of the spiny things were brought home and reared to make determination positive. On this plant the larvae tie the leaves together with silk and live in the pockets thus formed.

On May 2-4 the weather was cloudy with some light drizzles at San José and again on May 6-8 the weather was cold and windy, with heavy clouds but no rain. One or two of the nights were frosty and farmers smudged in parts of the Santa Clara Valley.

On May 9, on Mt. St. Helena, the weather was partly cloudy, cool and with a light wind, but was warmer later in the day in Lake County. About a dozen good specimens of *Mitoura nelsoni muiri* were taken, and other worn ones seen. The season in this area was unbelievably retarded. Flowers were in bloom that are normally entirely past by this time. *Vanessa cardui* was as common here as elsewhere. One *Colias chrysomelas* was seen but not captured. *Papilio rutulus* and *P. eurymedon* were also present but in exceptionally small numbers. *Euphydryas chalcedona* and *Melitaea palla* were also scarce. *Erynnis lacustra,* one of the prizes of the area, was not seen. I have not taken it now for several years.

On May 23, TILDEN collected in Alum Rock Park and on May 24, SMOKER did likewise. Pooled results: Weather hot and clear, drying rapidly: *Coenonympha california, Pieris napi* (1), *Glaucopsyche lygdamus, Euphydryas chalcedona, Melitaea palla, Lycaena gorgon, Plebeius acmon, Lycaenopsis argiolus;* no *Melitaea leanira* were seen this year.

May 24, summit of Mt. Hamilton: *Coenonympha california, Vanessa cardui* (in the usual large numbers), *Euphydryas chalcedona, Melitaea palla, Plebeius acmon, Plebeius icarioides, Papilio eurymedon* and *P. rutulus, Hesperia columbia* (several, but slightly worn), *Erynnis propertius, Thorybes pylades.* A single newly emerged *Speyeria callippe* was taken, the first of the year for this common species. The *Hesperia columbia* are apparently several weeks late, appearing usually in April.

May 31, Ukiah, California: *Papilio rutulus, Pieris rapae, Coenonympha california, Cercyonis alope, Vanessa cardui* (large numbers), *Adelpha bredowii, Limenitis lorquini, Euphydryas chalcedona* (very common), *Melitaea palla, Lycaena xanthoides, Strymon californica* (common), *auretorum* (scarce), *Hesperia lindseyi* (abundant - type locality - about fifty were taken in a single hour). I have never seen this or any other *Hesperia* so common at any time. However, this species is not by any means always so common, although it is not scarce. *Ochlodes agricola, Erynnis propertius,* and the Oak Moth, *Phryganidia californica,* were the other species noted.

June 7, Putah Creek and surrounding area, Yolo and Napa Counties: *Papilio rutulus* and *P. philenor,* the latter badly worn; *Pieris rapae, Colias eurytheme, Coenonympha california, Cercyonis alope, Nymphalis californica* and the usual common nymphalids; *Strymon sylvinus* exceedingly abundant- I have never seen so many of this species, mostly females and many slightly worn, indicating the peak of the brood was passed; *adenostomatis,* fairly common; *auretorum,* a very few, all badly worn; of the species present, only *S. sylvinus* was common. Later, same day: Mocho Creek, Alameda County, *Strymon dryope* (2) and *S. auretorum* (1); conditions very poor.

June 12, Arroyo Bayo and Mt. Hamilton Area, Santa Clara County: *Papilio eurymedon* (2); *P. zelicaon* (1); the usual common nymphalids; *Nymphalis californica* present but worn, apparently still overwintered individuals; *Lycaena xanthoides* and *L. gorgon*, common; *Strymon dryope*, few; *S. adenotomatis*, few, becoming worn; *S. auretorum* (1, first record for this locality); *S. saepium*, very common; *Lycaenopsis pseudargiolus; Ochlodes agricola*, few. Grass is not very plentiful in this area, and grass feeding skippers are usually scarce. However, a few *Hesperia lindseyi* usually appear rather late, but none this year.

June 15, Alum Rock Park, SMOKER found *Euchloe ausonides, Pieris napi, Zerene eurydice* (first he has taken there, one female), *Adelpha bredowii, Lycaena gorgon* (common), *Lycaena xanthoides, Tharsalea arota* (scarce), *Leptotes marina* (the first records for the area as far as I can find; three were taken). On June 17 the same species were taken as above, and two more *L. marina* were found.

June 1, Darwin Falls, Inyo County: *Celerio lineata* (very common and flying and mating by day), *Danaus plexippus, D. gilippus* (scarce), *Nymphalis californica* (few), *Vanessa cardui* (few but fresh), *Leptotes marina* and *Brephidium exilis* common, *Ochlodes yuma* (not common but fair numbers for this species, several taken and more worn ones seen, *Pyrgus communis* common. Later in the day at Olancha, Inyo County: *Plebeius melissa, Strymon sylvinus* (1), *S. melinus, Pseudocopaeodes eunus* (few).

Just before sundown, Havilah, Kern County, June 17: *Strymon saepium* and *S. californica*, fair numbers but worn; *Ochlodes agricola* (?) few and worn; *Erynnis propertius*, scarce and worn; just at twilight, the common moth *Sericosema juturnaria* was seen in large numbers feeding at the flowers of *Eriodictyon*.

June 18, Tehachapi, Kern County: *Pieris protodice, Colias eurytheme, Euphydryas chalcedona, Vanessa carye, V. cardui, Strymon melinus* (1), *S. californica* (few), *S. saepium* (common), *S. adenostomatis* (few), *S. auretorum* (2 slightly worn), *Lycaena rubida, Plebeius acmon* (2), *P. chlorina* (1), *Philotes* sp. (1), *Leptotes marina* (common). Conditions were hot, dry and with plants going out of flower, evidently too late.

July 2, San Antonio Wash and Camp Balfy, San Bernardino County, California: At lower end of Wash, *Philotes battoides* in fair numbers; farther up, *Lycaena gorgon, Tharsalea arota, Plebeius monticola, Strymon californica, S. saepium* (common), *S. sylvinus* (1), *Apodemia mormo* (few).

July 4, Tanbark Flat, San Dimas Experimental Forest, Los Angeles County: *Plebeius acmon, Tharsalea arota, Habrodais grunus, Pieris protodice*, and *P. rapae*, all worn; Butterflies scarce and poor in condition (Beetle collecting better).

July 6, Canyon just above Glendora: *Tharsalea arota*, very common with fresh males but few females; *Leptotes marina*, very common; *Erynnis funeralis*, scarce; *Heliopetes ericetorum* (2); *Colias harfordii* (1), and several common species.

July 17, Mono Lake and Tioga Pass: Cold, with heavy snow pack still on pass, insects scarce except for the abundant mosquitoes.

August 16-18, Mono County and Tioga Pass, conditions very good but insects not common: *Colias behrii, Pieris sisymbrii, P. occidentalis, Parnassius smintheus, P. clodius, Cercyonis oeta, Oeneis chryxus, Lycaena rubidus* and *L. cupreus* (fairly common), *L. nivalis* and *L. editha* (scarce), *Philotes battoides, Plebeius saepiolus, P. acquilo, Thorybes nevada, Polites sabuleti.* Collecting above Tioga Pass was fair, but numbers unusually few. In the lower areas of Mono County, the collecting was poor, conditions dry, and insects few. Near Bridgeport, we found *Coenonympha mono, Strymon dryope* (3), *Phyciodes montana* (1), *Tharsalea arota* (common but badly worn); this area was not up to usual par for this time of year.

Same trip, on return: Sonora Pass, at top—nothing flying of importance except lycaenids: *Plebeius melissa, P. saepiolus, P. icariodes, Philotes battoides, Phaedrotes piasus* (2), *Glaucopsyche lygdamus* (few); general collecting poor, *Speyeria* notably scarce in the mountain areas this year, nearly absent in localities where in previous years I had taken them.

August 31, Box Canyon: *Chiomara asychis* (1, Sonoita, September 1), *Hesperia uncas lasus* (2). September 1, Ramsey Canyon: *Philotes rita* (4), *Apodemia mejicanus* and form "madera", *Amblyscirtes aenus* (1), *Thorybes drusius* (3), *Codatractus melon* (4), plus others.

Late fall conditions in the Santa Clara Valley were open, as is often the case, with rains coming late but soon coming up to normal; no killing frosts by the first of 1953. *Ochlodes sylvanoides, Erynnis tristis,* and *Hylephila phyleus* were coming to flowers in the yard until late in November. *Crambus* spp. came to light until early December. Conditions at present, rain at least normal, weather alternately rainy and foggy, with little sunshine for weeks. Early plants already well up, giving prospects of good early collecting, unless unseasonably cold storms intervene.

ARIZONA

On July 9-12, 1952 we were in the GRAHAM MOUNTAINS, Graham County. We collected every day from 6000 feet elevation to the highest meadow, 9,054 ft. Collecting in general was excellent as the weather was favorable. This section of Arizona had experienced in the valley a mild dry spell but the mountains were fairly moist. The wild buckwheat was in bloom from 6000 ft. up and past its bloom below that. Wherever it was blooming, butterflies were swarming—especially the Blues. Higher up the mountain, in the meadows, cone flowers were in bloom and the iris were past their prime. *Vanessa cardui* was scarce at the lower elevations and became much more plentiful, being particularly obnoxious and troublesome at 9000 ft. Of course the big catch of the trip was the 9 ♂ *Neophasia terlooti,* all caught upon the buckwheat, very easy to catch—we got all we saw. None were seen outside the 7000-8000 ft. belt. Together with them were the prized *Erora quaderna,* much more difficult to see, for they hid in the *Eriogonum* and were quite fast fliers.

It was also a surprise to pick up *Melitaea theona*—is it *bolli* or *thekla*? *Apodemia nais* were fresh and most plentiful at about 8000 ft., but some were taken below this. Again it was surprising to pick up *Cecropterus cellus*; only one (fresh) was seen.

So much for the scarce stuff. The plentiful material was in general not as plentiful as I have seen it at the same time in 1936, 1937, and 1938. *Melitaea pola* were just beginning to come out, and females of *Speyeria nausicaa* were very scarce. *Euphydryas magdalena* should have been abounding but NONE was seen.

We also visited the WHITE MOUNTAINS with the WEBERS on July 13 and 14. Collecting was done 22 miles west of Springerville at approximately the collecting locality for *Oeneis daura*; of course we were too late, but *Speyeria luski* and *Euphydryas magdalena* abounded. *M. pola* and *S. nausicaa* were about as common as at Mt. Graham. In general the material here was more abundant but lacked the variety. *Cercyonis oetus* was plentiful at the edge of the meadows among the grasses.

D. L. BAUER gives the following report from NORTH-CENTRAL ARIZONA. The weather for the last twelve months was as follows:

The last few days of 1951 brought heavy rains to nearly all of the state. This brought out the spring annuals in great abundance. The weather remained mild and a little on the wet side through January and most of February with a few spring species of butterflies flying the last of January and first part of February. Down on the desert some species were out in considerable numbers.

March and the last few days of February brought cold, rainy and windy weather, and March of 1952 is the coolest on record for Arizona. This cold spell forced the spring species that normally began flying in March to remain dormant and there were practically no butterflies seen during this cold rainy period. Several March-flying species were much below usual in numbers when they did emerge and some were not observed at all.

The last few days of March warmed up and April and May were much warmer and drier than last year, resulting in a good flight of nearly all the late spring species; the usual April-flying species were augmented by a late emergence of a number of normal March species. June was also a very good month for butterflies in spite of the fact that temperatures averaged a little below normal. May and June are the dry months in most of Arizona and this year they were true to form, only .01 inches of rain was recorded for the two months.

The summer thunderstorm season began right on time with the first storm coming into the state from the southeast on the eve of the fourth of July. This was followed by a two-weeks dry spell, after which thunderstorms were the rule nearly every day over the mountains and occasionally in the valleys all through August and well into September. On September 20th a tropical storm entered the state from the south Pacific area and brought with it heavy rains in the mountains and mountain valleys, (around 2 inches in the Verde Valley). However, this storm left most of the lower desert areas dry or with slight rainfall. This late September storm did a great deal of

good, as it sprouted the seeds on many of the early spring annuals; the spring grass began to make the countryside greener than usual, so that by mid-October some areas were quite green. Most of October was sunny and mild with only a few light showers on the higher mountains. While the flight was by no means general many areas had a very good flight of fall species that depend upon the fall or late summer rains.

The first of November brought another day or two of late thunderstorms to the Verde Valley and surrounding mountains. Temperatures remained mild but were slowly dropping until the week-end of November 9th, when the first winter storm came into the state from the northwest, bringing a small amount of snow in the mountains. The rest of November was cold and rainy, with a storm and rain coming to the state about every seven or eight days and heavy snow in the mountains; making it one of the wettest Novembers on record. No butterflies were seen after the first winter storm. The first of December was a little warmer but winter conditions still prevailed for the area covered in this summary.

As a whole the 1952 season in central and northern Arizona was cooler and wetter than in previous years. The rainfall was spread out over a longer period of time, and temperatures were milder except in March. The late September and almost weekly November storms hold promise of excellent collecting next spring, barring the repetition of a spring cold spell.

In general the Papilios had the best flight that has been observed during the past four years. *Papilio philenor* had a good flight in the late spring and then dropped off during the summer and fall months. *Papilio polyxenes* was more in evidence than usual, but it is never very common in the northern and central part of the state except very locally. A number of larvae were collected and reared during the summer, and there was an increase in numbers in the fall.

Papilio bairdii deserves special mention this year, for in previous years only a few specimens have been seen and these not positively identified. In the late spring a number of specimens were observed at scattered localities, but in June the first specimen was taken and they were definitely known to be *P. bairdii.* There was steady increase in numbers during the last of June, until by July *P. bairdii* was the most abundant species flying in its chosen haunts. This abundance lasted throughout July and August, and a few late flying specimens were seen in September. About 75 specimens were taken, and the larvae were found in considerable numbers feeding on *Artemisia dracunculoides.* This great increase in numbers of *P. bairdii* was accompanied by the capture of two of the *P. bairdii* subspecies or forms—*P. bairdii hollandi* and *P. bairdii brucei.* The first specimen of *P. brucei* was taken in early May and then three more beautiful specimens in July. About three specimens can definitely be classed as *P. hollandi.* The above specimens mentioned are all true *P. bairdii* or *brucei.*

A number of specimens were observed that could be called *P. rudkini,* but the identification is not certain. Although there were considerably more such specimens seen this year than in past years, only one specimen was taken.

Papilio multicaudatus showed a great increase over previous years, but not as great as that of *P. bairdii.* The increase in numbers was constant throughout the season.

PIERIDAE: *Anthocaris sara* had a very poor year in the north-central section, the flight having just begun when the March cold spell began. During the cold spell no specimens were taken or observed and only very few around the first of April after it had passed. *Anthocaris pima,* which flies at a considerably lower elevation on the desert mountains, flew early enough to get in a better-than-usual flight before the cold spell hit. The cold spell being milder on the desert, the species weathered this period and was still flying in early April, which is considerably later than normal for *A. pima* in this area. *Euchloe creusa* was not seen this year.

Colias eurytheme seemed to be unaffected in numbers, but the spring flight was somewhat late. *Colias alexandra,* which flies in June, was still below the numbers of the late 1940's. *Zerene cesonia,* which had been very low during the past two years and showed only slight increase late last fall, made real gains this year and was quite common during most of the season. One specimen of *Z. eurydice* was taken on Mingus Mountain. This is a new record for the state of Arizona. *Phoebis sennae* made a little gain late in the season, and both species of *Eurema* made considerable gains, especially *E. mexicana,* which during June, July, and August exceeded *E. nicippe* in numbers in the Cottonwood area. *Nathalis iole* remained about the same as last year with the flight spread more evenly throughout the season. One specimen of *Neophasia menapia* was taken near Prescott; no others were observed anywhere. The last good flight of this species was August 1945. All species of *Pieris* were about as usual. The spring flight was somewhat delayed by the March cold spell, and *P. protodice* and *P. rapae* increased during the summer resulting in the largest flight of *P. rapae* in several years.

DANAIDAE: *Danaus plexippus* dropped back to normal after last year's slight increase, and there was a good flight of *D. berenice* during the summer and fall.

SATYRIDAE: *Euptychia dorothea* had a good flight in June with some increase and a very good flight during late August to early October. *E. rubricata* did not do nearly as well as last year, only a few specimens being observed on Mingus Mt. and less than last year at Prescott. *Cercyonis alope olympus* had a good flight in Oak Creek Canyon during late June and July, as did also *C. meadii* from mid-July to early October. *Gyrocheilus patrobas tritonia,* which is a fall flier, showed an increase again this year for the third year in a row.

NYMPHALIDAE: *Agraulis vanillae* was taken once in May and again in June and then disappeared for the rest of the season. It is not a resident species in the Cottonwood area. *Euptoieta claudia* was back to normal after last fall's abundance. *Speyeria nausicaa* had about a normal season. *Euphydryas klotsi* was below normal after last fall's great abundance. The spring flight was about two weeks late because of the March cold spell, and there was only a very meager fall flight after the late September heavy rains. The heavy fall rains were three weeks later than in 1951, and the fall flight, correspondingly later, came in October this year. *Euphydryas hermosa* had a very good

flight in Oak Creek Canyon, and a number of larvae were collected and reared the first of April. The Melitaeas had a good year. *M. gabbi sabina* was delayed about two weeks by the March cold spell, but was abundant the first of April in its usual haunts. *M. fulvia* had the best year yet; it was observed and taken from June to October, with the best flight coming around October 21, just a month after the heavy September rains. *M. pola* held its own this year. *M. dymas* remained about as usual, but *M. perse* made a better than usual late summer and fall showing. *Phyciodes campestris* showed a marked increase, as did also *P. mylitta* and *P. picta, P. picta* having been nearly absent the past two years. *Chlosyne lacinia crocale* and forms were about normal, while *C. californica* dropped back to normal after last fall's great abundance.

Both species of *Polygonia* showed increase, with *P. zephyrus* gaining more than *P. satyrus. Nymphalis californica* deserves special mention. After being almost entirely absent for years, last fall it made a comeback and this spring was very much in evidence, even on the desert among the cacti as far south as northern Yuma County. The Vanessas were all about normal, with a slight northwestward migration of *V. cardui* taking place for several weeks in the spring. The number of specimens observed from a given point was about one every four or five minutes, all flying in the same direction. Toward evening the individuals tended to stop and sun themselves on the rocks. *Junonia coenia* was not observed, for the third year in a row. *Limenitis astyanax* showed a considerable increase and *L. weidemeyerii* a slight decrease, while *L. obsoleta* held its own. One hybrid *L. weidemeyerii-astyanax* specimen was taken. *Adelpha bredowii* was about as usual, with the best flight coming in September. *Asterocampa celtis antonia* showed some increase for the second straight year, while *A. leilia* was not taken at all after having been the more abundant of the two last fall. *Anaea andria* got off to a slow start but ended the season with a good late summer and fall flight.

LIBYTHEIDAE: *Libytheana bachmanii* followed the usual pattern of a steady increase, but the fall numbers were well below last year's.

RIODINIDAE: *Apodemia mormo* had about an average season with some increase in the Cottonwood area. *Apodemia palmeri* had a good year with an increase in numbers in the late summer brood. *A. nais,* which first taken in the Cottonwood area last year, was in about double last year's numbers. *Emesis zela* had about an average year. *Calephelis nemesis*, which had only been taken around Camp Verde previously, was taken 20 miles farther up the Verde River this year and seemed to have a better year.

LYCAENIDAE: *Hypaurotis chrysalus,* a late summer and fall flier, had a good season. *Atlides halesus* had a good spring flight; a few were taken through the rest of the season. For *Strymon leda,* the flight was about normal: local and disconnected. *S. melinus* had a good year. *S. alcestis* had a brief but numerous flight during June. *S. autolycus* dropped to about half last year's flight after its sudden appearance a year ago. *Mitoura spinetorum* showed some increase. *M. siva* made great gains; it was first taken the last day of March, and there were successive broods throughout the season; the last specimens were taken the first of September. Incisalias were poor: only a few specimens of *I. iroides* were observed, making the second

very poor season after 1950 great abundance. *I. eryphon* also had a poorer-than-average year. *Erora quaderna* did very poorly this past year.

Leptotes marina dropped considerably, while *Hemiargus isola* was very abundant during the time the mesquite and catclaw were in blossom and then dropped back to normal. *Brephidium exilis* was about as usual. *Plebeius* species were about the same as past years, except that *P. lutzi* was more abundant at low elevations. *Philotes battoides* had a very good flight right after the March cold spell, and *P. enoptes dammersi* had a good fall flight showing increases some places, decreases others. *Glaucopsyche lygdamus* had another good year in the Prescott area; no collecting was done in other areas. *Lycaenopsis pseudargiolus* did very poorly in the mountains, in the spring, but came up with a strong summer and fall flight and did better than usual on the desert by getting the spring flight in before the March cold spell.

HESPERIIDAE: *Polygonus amyntas* was taken for the first time in the Cottonwood area. *Epargyreus clarus* dropped some from previous years, as did also *Zestusa dorus. Thorybes pylades* did poorly in the spring but recovered lost ground in the summer. *Cogia hippalus* did poorly in the spring but greatly increased after the summer rains the last of August. *Caicella caicus* followed the same pattern, poor in spring, very good in late summer. *Pyrgus scriptura* remained rare. *P. philetus* was poor in spring, increased in late summer. *P. communis* was about as usual. *Heliopetes ericetorum* showed steady increase until it was common in the late summer and fall. Of *Antigonus pulverulenta,* only a few strays were seen. *Celotes nessus* was about normal. *Pholisora mejicanus* remained about the same, a little late in the spring. *P. ceos* was late in the spring and about the same the rest of the year. All species of *Erynnis* remained about the same in numbers. The early spring species were late, and *E. funeralis* showed marked increase in late summer and fall. *Copaeodes aurantiaca* fared about the same as usual. *Yvretta carus* was not observed this past season. *Hesperia williamsi* did very well, had a fair flight in June and an abundant flight in late September and October. *H. woodgatei* had a greatly increased flight in September and October. *Poanes taxiles* reappeared on Mingus Mountain, after being absent the past two years; elsewhere it had a better than average year. *Atrytone ruricola* dropped a little in numbers this year. All the *Atrytonopsis* species dropped this year: *A. deva* wasn't taken; *A. vierecki* only a few; *A. pittacus* was not observed at all; *A. python* was down in numbers. *Amblyscirtes aenus* was about average, but *A. eos* was not observed. *Lerodea eufala* made a better than usual late fall appearance (November).

Megathymus yuccae did not do as well as last year; this might be because of the March cold spell which just preceded the time of emergence. I can't really make a comparison of the fall flying *Megathymus,* because as a result of a visit by DON B. STALLINGS, much more extensive efforts were made this year than last in collecting them. However, it appeared to me that both *neumoegeni* (formerly reported by me as *M. polingi,* but now determined by Mr. STALLINGS as true *M. neumoegeni*) and *Megathymus aryxna* (formerly listed as *M. neumoegeni,* but now that true *M. neumoegeni* has been rediscovered, the name *M. aryxna* applies to this species) seemed to have a considerable increase in numbers, but it might have been only because of more intensive collecting; 108 specimens were taken.

A week spent collecting on the KAIBAB PLATEAU the last of June and first of July resulted in a number of good species being collected. Most of the collecting was done at Bee Springs and Big Springs on the west side. The early spring species were for the most part over with, and the summer species were just getting started. In spite of this fact, collecting was very good, and about 50 species were collected. Some of the outstanding species in rareness or abundance were as follows: one male of *Papilio indra minori;* one *P. zelicaon;* one *P. rudkini;* several *P. bairdii* were observed but none captured. *P. rutulus* was the most common species of *Papilio.* The Pieridae were almost entirely absent; only *Colias eurytheme* was flying in numbers. A few *Eurema nicippe* and one *E. mexicana* were taken, and some *Nathalis iole* and *Zerene cesonia* were observed. *Eumenis ridingsii* and *Cercyonis masoni* were just beginning their flight period, as were also *Speyeria atlantis shellbachi, Callipsyche behrii,* and *Philotes spaldingi* and a number of others. Mr. CHRISTENSEN of the Park Service later reported abundant flights of *C. masoni* and *S. shellbachi,* as well as other late species such as *Hypaurotis chrysalus, Tharsalea virginiensis,* and *Lycaena heteronea.* Several specimens of the little known Arizona race of *Speyeria snyderi* were taken. *Melitaea pola* was the only Checker-spot that was flying at the time. There were numerous species of Skippers; the most abundant of them all was *Polites draco.* The most common Blue encountered was *Plebeius icarioides.*

Not much MOTH COLLECTING was done, but the following species were taken: *Phlegethontius sextus, P. quinquemaculatus, P. rusticus, Sphinx chersis* and *S. dollii, Pachysphinx modesta, Hemaris senta,* and *Celerio lineata. Dictyosoma elsa* took a big jump in numbers, from just one or two specimens being taken, to about forty. It was the most common Sphingid flying during April and May, and a few specimens were flying in the fall. Following the spring flight, the foodplant was stripped of leaves by the larvae of this normally scarce moth. *Hyalophora gloveri* was taken; no *Automeris pamina* were seen. Some *Hemileuca nevadensis* larvae were collected at Holbrook, Arizona, and brought home to be reared; adults emerged during October. *Adelocephala heiligbrodti* was below last year's numbers. The various species of Arctiidae fared well this year, with increases in several. Phalaenidae were about as usual although not much observation was done in this group. There was a good flight of *Gloveria arizonensis,* and two undetermined species of *Tolype* were taken.

DON EFF submitted a brief report:

We collected in OAK CREEK CANYON, where *Limenitis wiedemeyerii* was the most prevalent species. From there we went to COTTONWOOD, Arizona, and in company with DAVID BAUER had the best collecting of the entire trip. In the edge of the cottonwoods and willows bordering the stream near town we took a few *L. obsoleta.* And on the Chinaberry trees, which were in bloom, we found some *Strymon alcestis.* Then we drove up on MINGUS MOUNTAIN ABOVE JEROME and collected in the damp spots along a stream in one of the gullies that parallels the road. Here were *Asterocampa, Adelpha bredowii, Euptychia dorothea,* more *L. wiedemeyerii, Eurema mexicana* and *Lycaenopsis pseudargiolus* by the thousands. For *L. pseudargiolus,* you simply sat down along side a swarm of them and with forceps picked out the best ones and dropped them in the cyanide can. Following

this we drove on over the top of Mingus Mountain and in another stream bed on the other side (west) we found the prevalent species even more plentiful, if such a thing were possible. When disturbed the air was simply alive with butterflies.. looking almost like the pictures you see of the grasshopper plagues! However, the variety was about the same, except that we did manage to add a couple of specimens of *L. astyanax.* These two spots contained the greatest concentration of butterflies I have seen since the time JOHN HOPFINGER and I found Papilios congregating by the hundreds on wet sand at Gold Creek, Washington. The most abundant species on Mingus Mountain however, were *A. bredowii, L. pseudargiolus,* and *L. wiedemeyerii.* From here we drove down through Phoenix and on to Mt. Graham at Safford, Arizona. Collecting on MT. GRAHAM was attempted on a Sunday, something I would never advise anyone to try, for everyone in that part of Arizona apparently tries to spend that day in the coolness of the evergreens that cover the side of this interesting mountain. *Neophasia terlooti* was the particular object of our search, but we were too early, and the only things seen were a few *Phyciodes. A* combination of unhappy events caused us to forsake this place without giving it the chance it deserved. We also caught a few *E. rubricata* in the vicinity of Noon Creek, on the lower slopes of Mt. Graham. Near GLOBE, ARIZONA, in the desert we found a couple more specimens of *Strymon alcestis* and some *Apodemia mormo.* This concluded our Arizona collecting.

Notes from J. W. TILDEN.

June 26, en route in Arizona, near Cochise, weather exceptionally windy. Common species much in evidence: *Pieris protodice, Colias eurytheme, Eurema nicippe, Danaus gilippus, Pyrgus communis.* Later in day at entrance to Pinery Canyon, Chiricahua Mts.: Same species, plus a few *Phyciodes picta, Junonia coenia, Copaeodes aurantiaca,* and *Pholisora ceos.* Well up Pinery Canyon were found *Euptychia rubricata, Erynnis funeralis, Mitoura siva* (badly worn), *Antigonus evansi* (few). At Onion Saddle the only common insect was *Atrytonopsis deva,* mostly badly worn, but some in good condition. Conditions were rather dry and past. June 27, Rustler's Park, conditions were apparently good: *Euptychia henshawi* (2), *Paramecera xicaque* (1), *Amblyscirtes bellus* (few), *Epargyreus clarus, Atrytonopsis deva, A. python* (3), and a number of commoner species. A single fine male *Poanes taxiles,* the first I had ever seen alive, was taken. The time element prevented the lengthy stay at this locality, which would, I am sure, have been justified in material if it had been possible.

June 28, Ramsey and Carr Canyon, Huachuca Mts., conditions very dry and poor: *Mitoura siva* was taken in fine to slightly worn condition, fairly common; one *Amblyscirtes cassus; Euptychia rubricata* common but badly worn.

June 29, Patagonia and Sonoita, Santa Cruz County: Heavy rain last evening; conditions moist but since this is the first rain of the season, insects not much affected: *Melitaea perse, M. dymas, M. bollii, Leptotes marina* (abundant), *Danaus gilippus* (exceedingly abundant, most I have ever seen, present at least by hundreds, perhaps thousands, so common that it is hard to find other butterflies), *Anthanassa texana* (few). Collecting was poor, with one bright

spot a single specimen of *Amblyscirtes aenus.* Later same day, Madera Canyon, Santa Rita Mts.: *Euptychia rubricata* (worn), *Thorybes pylades* (abundant), *T. drusius* (1), *Erynnis funeralis* (few), one *Achalarus casica,* and one *Amblyscirtes eos.* Weather was exceedingly hot; even local residents complained.

Contributors: D. L. BAUER; J. D. EFF; L. M. MARTIN; J. A. POWELL; F. W. PRESTON; O. E. SETTE; S. R. SMOKER; F. T. THORNE; J. W. TILDEN.

Los Angeles County Museum, Exposition Park, Los Angeles, Calif., U.S.A.

2. NORTHWEST — OREGON, WASHINGTON, IDAHO

by J. C. HOPFINGER

After a normal winter in most sections, the summer was unusually dry. Collecting was for the most part average or less than average in quality. No widespread migrations were reported, but certain migrant species, such as *Nymphalis californica* and *Vanessa* spp., were recorded as being locally abundant.

OREGON

The only report received was from L. M. SCOTT of Portland, who states that a cool winter and rainy spring resulted in poor collecting in the western part of the state. *Papilio multicaudatus* was taken in early May near The Dalles, Wasco Co. In June near Estacada, Clackmas Co., *Speyeria leto, Euphydryas colon,* and *Pieris napi* were all rather abundant, *Parnassius clodius* was in fair numbers, and *Papilio rutulus* was rather scarce. In the Mt. Hood area *Nymphalis californica* was very abundant; several species of *Speyeria* were present in late August.

WASHINGTON

WALLA WALLA DISTRICT. The excellent report by WILLIAM C. COOK is given in full:

This past year my Phalaenid collecting has been almost wholly confined to light trapping at Walla Walla and at Twin Falls, Idaho. No field collecting was done.

Last winter was somewhat below normal in temperature, but this was followed by weather warmer than normal in spring and summer. Five of the six months between March and August were drier than normal. This warm summer weather appeared to speed up the production of broods in those species which have more than one brood, and the drought was somewhat unfavourable for some of the true cutworms that are double-brooded.

Collecting as a whole was very poor. At Walla Walla only 1929 moths, or an average of 24.4 per night, were taken. This is the lowest average I have obtained in 8 years of trapping, and is about half the normal number of moths. At Twin Falls, the trap run by J. R. DOUGLASS captured 9.4 moths per night, which is also about one-half of the 8-year average.

The following tabulation gives the data on the more abundant species at both places:

WALLA WALLA, WASH.		TWIN FALLS, IDAHO	
	1. Species more common than in 1951		
Species	Dates of occurrence	Species	Dates of occurrence
Euxoa septentrionalis	Aug.-Sept.	*Euxoa laetificans*	July-Oct.
Euxoa tessellata	June-July	*Euxoa declarata* group	Aug.
Feltia ducens	Aug.-Sept.	*Feltia ducens*	July 21-Sept. 30
Lycanades purpurea	October	*Crymodes devastator*	June 11-Sept 10
Crymodes devastator	July-Aug.	*Heliothis obsoleta*	July 21-Sept. 10
Schinia 6-plagiata	Aug.	*Autographa brassicae*	May through August, no definite broods.

2. Species about the same as in 1951

Walla Walla	Twin Falls
Peridroma saucia	*Euxoa olivia*
Graphiphora c-nigrum	*Euxoa tessellata*
Scotogramma trifolii	*Agrotis vetusta*
Eriopyga curtica	*Graphiphora c-nigrum*
Xylomiges rubrica	*Scotogramma trifolii*
Ceramica picta	*Lacinipolia stricta*
Leucania farcta	*Oligia fractilinea*
Septis arctica	*Laphygma exigua*
Platyperigea extima	*Heliothis phloxiphaga*
Stibadium spumosum	*Autographa simplex*
Heliothis phloxiphaga	
Heliothis obsoleta	
Autographa simplex	
Autographa californica	
Caenurgina erechtea	

3. Species less common than in 1951

Walla Walla	Twin Falls
Euxoa olivia	*Euxoa messoria*
Euxoa catenula	*Euxoa septentrionalis*
Euxoa sponsa	*Euxoa ochrogaster*
Euxoa messoria	*Leucania farcta*
Euxoa atomaris	*Platyperigea extima*
Mamestra configurata	*Autographa californica*
Xylomiges curialis	*Oligia tonsa*

NOTES:

Some interesting developments among the common species were:

Euxoa ochrogaster, which has been of economic importance in parts of Washington, Oregon, and Idaho during the past two years, was reduced to its normal status this season, and no complaints or larvae were received.

Euxoa septentrionalis, which has no economic record other than in Oregon in 1951 on alfalfa, was very abundant around Walla Walla in 1952, but no complaints were received.

The fall brood of *Platyperigea extima,* which is usually larger than the spring brood, was nearly suppressed by the dry summer conditions. Over 600 moths of the first brood were captured, but only 114 of the fall brood.

Apparently *Autographa californica* had an extra brood because of the warm weather, and the fall brood occurred at just the right time to do severe damage to fall spinach. Usually this species comes on just enough later than the spinach so that harvesting is over before many of the larvae are large.

Heliothis obsoleta was more than usually abundant in sweet corn around Walla Walla, although this is not indicated by the light trap record.

Euxoa sponsa and *E. messoria,* two of our commonest garden cutworms, have been low in numbers for several years. If they do not increase before many seasons, I will begin to think that the widespread use of DDT for other purposes has built up enough in the soil to kill off the young larvae. This is purely a surmise. The species of *Xylomiges* which live on fruit trees also are all low in numbers, possibly because of efficient insecticides used on other insects.

CENTRAL WASHINGTON. L. S. PHILLIPS records 38 species of butterflies taken in the first week of July, and quotes Mrs. EMILY HENRIKSEN as saying the collecting was very poor. Due to a severe illness Mrs. HENRIKSEN has been unable to submit her usual valuable report.

NORTH-CENTRAL WASHINGTON. The Area Co-ordinator reports: The winter 51-52 was mild, with only one near zero spell during the first part of January. Early species were on the wing during the first week in April. On the 20th of the month, of the early Pieridae, only *Pieris sisymbrii* appeared in any numbers. *P. beckeri* and *P. occidentalis* were very scarce. *Euchloe creusa* was in good numbers, *E. ausonides* nearly absent. *Anthocaris sara,* usually fairly common, was nearly absent, only 2 males being taken. Two weeks later *Melitaea sterope,* usually fairly abundant, was represented by only 3 pairs. All Lycaenidae were scarce, with the exception of *Philotes battoides,* which was abundant along the wet sands of the Columbia River. By the end of May at some 1000 ft. elevation all local Lycaenidae were plentiful: e.g., *Plebeius montis* and *P. melissa,* but *Phaedrotes piasus* was scarce. *Coenonympha elko, Phyciodes mylitta,* and *Euphydryas anicia* were in good numbers. All *Papilio* were scarce at this elevation. *Oeneis nevadensis* was beginning to appear. *Phyciodes tharos* made a remarkable recovery from the effects of the 1948 flood, which nearly exterminated it. Along the Columbia at suitable places it was present in its former abundance. *Apodemia mormo,* also a victim of the flood, was absent and may be extinct in its former habitats along the river. By the beginning of June, *Oeneis nevadensis,* true to its 2-year cycle, showed up very well in its habitats. *Erebia episodea* at the lower elevations was well represented. *Limenitis lorquini* was much reduced in numbers. The remarkable thing was the nearly total absence of all *Cercyonis,* usually not at all hard to find. Of *Speyeria* only *coronis garretti* had a good flight in the lower country. *Strymon acadica* was common, as was *Callipsyche behri.* A few *Satyrium fuliginosa* showed up after years of absence. *Colias edwardsi* was still moving south, as a female was taken near town, the first one in nearly 40 years of collecting. In the middle of

July, ANDERSON reports, at an elevation of some 4000 ft. *Erebia vidleri* was absent, *Speyeria mormonia* was common, *Euphydryas anicia* was old and worn, *Plebeius saepiolus* common, *Oeneis chryxus* in the usual few specimens, there was a scattering of *Parnassius, Speyeria atlantis* was scarce. By August 1, at Harts Pass, elevation 6200 ft., *Parnassius* was getting worn, with *P. clodius* in good numbers, *P. smintheus* scarce. Of *Erebia vidleri* few were in flight, and these were getting worn, *Speyeria mormonia* was common, *S. rhodope* much less abundant than in former years, *Boloria chariclea rainieri* was common, *B. epithore* much less in evidence. During August and up to the middle of September *Papilio oregonia* continued to be common, as for the past several years. On October 15 a good flight of *Vanessa cardui* showed up at the house, all fresh new specimens, with a good sprinkling of *V. carye.* The latter seem to prefer a spot under one of my shade trees, where they show up year after year. It is never common here. All in all, I would call the season average.

COASTAL REGION. JAMES C. PEARSON reports as follows: The winter of 1951-1952 was not unusual, freezing periods, wet periods and average temperatures were within the normal. 1952 as a whole was a record dry year with summer weather extending through October. However, it was not particularly hot.

I have noted daily abundance of the species I have seen for the past seven seasons. Comparing with these, I find that about Seattle in 1952: *Pieris rapae* was more numerous than usual throughout the season; *Nymphalis antiopa, Vanessa cardui,* and *N. milberti* were more common than I have ever observed them, *V. cardui* larvae infesting the gardens during July and the first half of August and the butterflies flying in tremendous numbers all fall; *Lycaena helloides* and *Phyciodes mylitta,* both of which usually appear in the spring and are common in late summer, were observed only once in the spring, each about a month later than usual, and in the fall very seldom, also a month late. Common Seattle species that appeared in average quantity were: *Papilio rutulus, Nymphalis californica, Vanessa atalanta, V. carye, Limenitis lorquini, Anthocaris sara, Incisalia iroides, Pyrgus ruralis,* and *Ochlodes sylvanoides.*

Here are summaries of collecting trips:

Mt. Si, King Co. (4000 ft.) still had a little snow on May 30 and very few of the alpine flowers were blooming yet. I found many *Vanessa cardui* and *Erynnis* (species?), a few *Hesperia juba* and Blues, and a single *Parnassius clodius, Anthocaris sara,* and *Incisalia iroides.* On August 13 there were abundant *Speyeria hydaspe, Euphydryas taylori, Lycaena mariposa* (ragged), *Vanessa carye, Nymphalis californica,* and Blues, plus some *Speyeria mormonia, Boloria epithore, Nymphalis milberti, Parnassius clodius,* and *Ochlodes sylvanoides.*

Yakima Park, Mt. Rainier, had snow patches and limited alpine flowers on July 5. On a fine day I observed two *Nymphalis milberti* and dozens of fresh *Euphydryas taylori,* but no other species.

At Packwood, Lewis Co., where I collected on July 5, 1947, and July 6, 1952, the country was much drier this year, with *Speyeria coronis simaetha*

much more common. There were many *Papilio rutulus, P. eurymedon,* and *Parnassius clodius,* and a few *Speyeria cybele pugetensis, Pieris rapae, Vanessa carye,* and *Nymphalis milberti.*

The first trip I have taken to Tenino, on July 7, was a tremendous disappointment. I found only a number of common species in worn condition, and a dozen *Coenonympha insulana.* I could find no trace of *Euphydryas anicia.*

Near Mt. Baker Lodge (4400) on August 27 and 28 most of the specimens were slightly worn. All but *Nymphalis californica* and a few *Boloria* were limited to flowered slopes facing south, most other slopes being covered with heather. There were abundant *N. californica, Boloria epithore, Boloria rainieri, Lycaena mariposa,* and Blues, a few *Speyeria hydaspe, S. mormonia, Euphydryas taylori, Nymphalis milberti, Vanessa carye, Pieris rapae,* and *Parnassius clodius* (small specimens), and single *Erebia vidleri* and *Polygonia.*

I collected at Sloan Peak, Snohomish Co., on September 23. The area was very dry by this time. Battered *Nymphalis californica* were found up to 4000 ft. and swarms of fresh *Polygonia* were about the stream banks as high as I went, 6000 ft. At this elevation there were also mostly worn specimens of *Speyeria mormonia, S. hydaspe, Boloria epithore, Nymphalis milberti, Lycaena mariposa, Parnassius,* and Blues.

Fresh *Polygonia* were numerous at Snoqualmie Pass and Beckler River on September 14, and at Sloan Peak and Monte Cristo on September 23 and 24. There were many *Cercyonis alope* at Pipe Lake on August 3. I found two *Hesperia juba* at Pipe Lake on June 1 and four on Mercer Island on September 10.

PUGET SOUND AREA. DON P. FRECHIN reports: Diurnal collecting was extremely poor with a few exceptions. Spring collecting, usually most productive, was very disappointing. The following species were flying in greatly reduced numbers: *Anthocaris sara, Pieris napi, Coenonympha tullia, Boloria epithore, Euphydryas editha, Phyciodes tharos, P. mylitta,* all *Polygonia, Strymon melinus. Incisalia* was at its lowest ebb, with *I. iroides, I. polios,* and *I. eryphon* almost nonexistent. *Callophrys viridis* was almost totally absent. *Lycaena helloides, Everes amyntula, Plebeius icarioides, Glaucopsyche lygdamus, Lycaenopsis pseudargiolus* evidenced a subnormal flight, but not as markedly reduced as other Lycaenidae. All Hesperiidae were greatly reduced in numbers. The only bright spot in the Spring flight was the showing of *Mitoura johnsoni.* In the Olympus Mts., *M. nelsoni* was slightly below normal. Summer collecting, never very good at low levels here, was practically non-existent. *Speyeria cybele pugetensis* had its poorest year. *Neophasia menapia* was the only species to appear in above-normal numbers, it having been absent here for years. Collecting in the Cascades in July was much more productive. Good series of *Parnassius clodius* and *Boloria epithore* were taken. *Plebeius icarioides* was again very abundant. A colony of *Lycæides argyrognomon* was located on top of Stevens Pass. *Papilio eurymedon* and *P. rutulus* were abundant.

BRITISH COLUMBIA

RICHARD GUPPY'S report from Vancouver Island was the only one received, and is given in full:

The 1951-1952 winter was nearly normal, April and May were favourable, but June was unusually cool, though rainfall was still below normal. Snow fell at 3000 ft. about June 10 with effect on early Lepidoptera as yet unascertained. I had collected at that altitude on May 27 and found all early butterflies in full flight.

1951 and 1952 will go down in the records as practically a two-year drought, but I do not think that insects were seriously affected in 1952. June was cool and evidently very favourable to plant growth. July was hot, but August and September were cool with enough showers to keep herbage from becoming parched. October and November, though both months were the driest on record, were likely not that way from the point of view of insect life. Showers, mist and fog do not show much in the rain gauge, but they keep the soil damp.

For this year the general trend of butterfly populations can be very nicely summed up. Species flying in May or earlier were all down in numbers. Summer collecting was uniformly good. Double-brooded species showed a decline in the early brood, with fair to good recovery in the summer generation. Deviations from the above trends were as follows.

SPRING BUTTERFLIES: *Lycaenopsis pseudargiolus* and *Everes amyntula* were as abundant as usual. A few specimens of *Mitoura* (*nelsoni ?*) were taken, compared with none in 1951.

SUMMER BUTTERFLIES: *Speyeria zerene* and *S. hydapse* were somewhat less abundant than last year, though still plentiful. *Neophasia menapia* showed no noticeable increase. The most striking increases were shown by *Limenitis lorquini, Cercyonis alope,* and *Ochlodes sylvanoides.* Although I was not able to follow *Oeneis nevadensis* through its normal season, indications at the end of May and early in July lead me to believe that the usual biennial flight showed up as well or better than in 1950.

NYMPHALID MIGRATIONS this year seem worthy of special note. A spring migration of *Vanessa cardui* arrived. These early migrants were very ragged by July; at this time some fairly fresh specimens were seen, coincident with a general increase in the *V. cardui* population. Either a second migratory wave arrived, or two generations developed during the season. The second guess seems the most likely to be accurate. A late brood came out during August and September. All these late butterflies were extremely fresh and brightly colored, very quiet and easily netted, in strong contrast to the earlier brood.

Along with the late *V. cardui* were a fair number of *V. carye.* These were also very fresh specimens, presumably the offspring of a spring migration which had passed unnoticed. This is the first record I have of *V. carye* appearing in anything approaching fair numbers.

The first *Nymphalis californica* migration since 1945 appeared in late August. Not many individuals reached as far north as Wellington. Around Victoria in early September they appeared quite common. All specimens taken were worn and tattered.

No Saturniidae were seen, and no Sphingidae except a few *Hemaris diffinis.* Nearly all Arctiidae were scarce or absent, including the usually abundant species. An exception to this trend was *Leptarctia californiae,* which was seen quite frequently during collecting at high altitudes. In previous years I have always failed to find it in the same locality. One adult and one larva of *Halisidota argentata* were found, these the first seen for several years.

July was the only month favourable for Phalaenidae. August and September nights were frequently cool. During July, *Cerura scolopendrina* came to light quite frequently, this species previously represented in my collection by two specimens taken in 1948. *Autographa celsa* appeared fairly abundant, and largely replaced the usually common *A. californica.*

In Geometridae a very noticeable circumstance was the decline in *Mesoleuca gratulata,* usually an excessively abundant diurnal species.

Only very few autumn-flying geometrids were seen. During December the weather was exceptionally mild, but *Erannis vancouverensis* failed to appear, after having been seen last year. *Operophtera occidentalis* had a wonderful season, still around at time of writing, December 23, a full month after its first appearance.

Contributors: W. C. COOK; D. P. FRECHIN; RICHARD GUPPY; J. C. HOPFINGER; J. C. PEARSON; L. S. PHILLIPS; L. M. SCOTT.

Brewster, Wash., U.S.A.

3. ROCKY MOUNTAINS — ALBERTA, MONTANA, WYOMING, UTAH, COLORADO, NEW MEXICO

by J. DONALD EFF

The winter of 1951-52 was an excellent one, with sufficient moisture throughout most of the area. The Big Horn area of north central Wyoming had a dry, early spring, but Colorado and New Mexico opened the collecting season about on schedule. Both states enjoyed good rainfall. The month of May in the Denver area was about the wettest in a good many years, giving the earth a luxuriant coat of green which should have provided the larvae of the earlier species with a plentiful supply of their favorite food plants. However, unlike New Mexico which enjoyed fairly good rainfall

throughout the summer, Colorado was extremely dry during the month of June, with only .77 of an inch of rain being recorded for the entire month.

WYOMING

Duke Downey of Sheridan in the Big Horn Mt. region reported that things were 2 to 3 weeks early there with such things as *Anthocaris sara, Euchloe ausonides,* and *Papilio multicaudatus* appearing at the beginning of May instead of late in the month, their normal period of emergence. *Vanessa cardui* was abundant; others more common than usual included *Coenonympha tullia, Plebeius saepiolus, Phyciodes tharos* and *Pyrgus communis. Speyeria* were a little more plentiful than in the past, and *Euphydryas bernadetta* was found for the first time in several years. *Papilio rutulus* and *P. multicaudatus* were scarce and *P. eurymedon* entirely absent. Some of Downey's better catches for that area, aside from *E. bernadetta,* were *Oeneis uhleri, Boloria selene,* and *Nymphalis californica* which, while common in some areas, is not considered so in the Rocky Mt. Region.

In the moths, the Saturniidae were below normal, and the *Catocala* were scarcer than in years. *Celerio lineata* was common, and *Pachysphinx modesta* showed an increase over its usually scarce numbers.

UTAH

The only report from that state is my own, which because of my unfamiliarity with the fauna and collecting conditions, is of a very incomplete nature. At Arches National Monument near Moab, Utah, we found *Pieris beckeri* along the road leading into the Monument fairly commonly, but it was the only species seen, aside from one *Mitoura siva* which I was unable to capture. The next collecting was at Zion National Park. Conditions were very dry here, and the only things found in any numbers were *Hemiargus isola* and *Leptotes marina.*

COLORADO

Collecting in this state apparently was better as a whole than at any time in the last several years. With plenty of snow in the mountains and abundant moisture in May, the ingredients for the start of a good season at least were present. Floyd and June Preston collected in the southwest corner of the State at Mesa Verde National Park, at Durango, at South Mineral Creek Camp near Silverton, on Monarch Pass in Chaffee County, Wolf Creek Pass and then farther north in the general Denver area, on Berthoud Pass, and Loveland Pass and in my company on the Poudre Canyon, north of Fort Collins in Larimer County. Brother John J. Renk of Regis College in Denver collected the Denver area, as well as Boulder County (my back yard!) and also spent a little time at Fraser, Colorado, just over Berthoud Pass, on the western slope, and on Grand Mesa near Grand Junction. I collected briefly along the LaPlata River near Durango, in Poudre Canyon north of Fort Collins, on Mt. Evans, Clear Creek County, but mostly in Boulder County. All of us found the collecting excellent with a couple of exceptions.

In the northern part of the state the only spot collected was Poudre Canyon, a place that gave high promise. *Melitaea arachne* was found here in good numbers, the first specimens I've seen here since GEORGE W. RAWSON and I took specimens of a second brood in 1948. It still is absent from the Boulder area. Also much more common in Poudre Canyon than in the Boulder area was *Speyeria halcyone. Ochlodes sylvanoides* was abundant there, and many worn specimens of *Ochlodes snowi* were seen. Along the Continental Divide the alpine collecting, while good, was not of the best, at least with respect to such things as *Erebia magdalena, Lycaena snowi,* and *Melitaea damoetas. Oeneis lucilla* showed an increase, as did *Erebia callias* which practically swarmed in places. Most of the other alpine inhabitants were present in near-normal numbers. At the lower elevations there appeared to be an increase in the number of *Strymon melinus* and *Callipsyche behrii. Incisalia mossii schryveri* seemed also to be definitely on the upswing; I took 15 specimens this year compared with the 2 or 3 seen for the past couple of years. *Callophrys sheridani* was less common than usual, but *Incisalia polios* seems to be gaining in numbers also. *Colias alexandra* males were so plentiful that they turned the areas in the vicinity of roadside mud-puddles into a sea of yellow. Blues also swarmed there, with the most notable increase being in the numbers of *Plebeius acmon.* Others that showed increases are *Oeneis uhleri,* which Brother RENK reported as practically swarming in Gregory Canyon which is about ¼ mile from my house, and *Oeneis chryxus* and *Neophasia menapia,* also *Nathalis iole.* Still scarce were *Phyciodes mylitta barnesi* and *P. tharos.*

To the west, over the Divide, Brother RENK found *Anthocaris sara, Polygonia satyrus, Glaucopsyche lygdamus, Euchloe ausonides, Pieris napi,* and *Boloria freija* common in the vicinity of Fraser in June, and in July such things as *Oeneis chryxus, Parnassius smintheus, Plebeius melissa, Lycaena rubidus*, and three species of *Speyeria.* Also he reported *Tharsalea arota* common on Grand Mesa. While no report has been received from W. C. MINOR of Fruita, Colorado, near Grand Junction, personal correspondence has provided me with the fact that *Mitoura siva* fairly swarmed in that area this summer, and that *Minois masoni* was quite common in Devil's Canyon and on Black Ridge in Mesa County. On our way to Utah we stopped to make the personal acquaintance and visit with this combination collector-writer-photographer and all-round naturalist. In company with Mr. MINOR and HANS ACKERMAN of Wheatridge, Colorado, we paid a visit to Coal Mine Point on Black Ridge, the type locality for *Papilio indra minori.* Although present at the correct time, we saw no *P. minori* at all. In the sagebrush however, we found *Euphydryas anicia* fairly common.

In the southern part of Colorado we are indebted almost entirely to the records of FLOYD and JUNE PRESTON. At Mesa Verde collecting was poor with only *Vanessa cardui* and *Minois oetus* being present in any numbers. At Durango the only things found commonly were *Hypaurotis crysalus* and *Speyeria edwardsi*, the latter being in worn condition. At South Mineral Creek Camp near Silverton they found the following abundant: *Speyeria eurynome, Parnassius smintheus, Erebia epipsodea, Plebeius aquilo, Oeneis chryxus, Plebeius saepiolus,* and *Pieris napi.* Inclement weather allowed almost no collecting at Red Mt. Pass in Ouray County, but at Monarch Pass in Chaffee County they found good variety but little abundance of any species

except *Vanessa cardui* and *Celerio lineata. Colias scudderii, Lycaena helloides,* and *Oeneis chryxus* were among the more numerous. Wolf Creek Pass between Pagosa Springs and Monte Vista provided excellent collecting and good numbers of many things. This was one of the few spots where apparently *Phyciodes tharos* was fairly plentiful. *Speyeria* were rather common here also. On August 23 and 24 I made a trip to the Wet Mts. west of Pueblo, Colorado, and collected in the vicinity of Wetmore and Beulah. I was after *Polygonia hylas* in particular but apparently never located their "locale", as I only took a couple. However, I was surprised to find *Polygonia faunus* here and the commonest of the three species of *Polygonia* to be taken. Most of the collecting was done on Bigelow Summit which is a low pass in the foothills, and surprisingly enough the collecting was very good here for as late in the season as it was. *Hesperia harpalus* was a common species, along with *Phyciodes camillus* and *Lycaena rubidus.*

NEW MEXICO

In this state we are indebted to O. D. STANDARD, of Belen, and the PRESTONS, who collected in the Sandias. As previously mentioned, New Mexico enjoyed a good summer, a blessing after the drought conditions of 1951. The change was apparent in that nearly all species showed a partial increase in numbers, one exception being *Papilio polyxenes* which was common in 1951, scarce in 1952. The one surprising thing was the fact that after the hordes of *Celerio* caterpillars that appeared in 1951, there seemed to be no appreciable increase in the number of adults. *Papilio multicaudatus* showed a noticeable increase this year. Also noted is an increase in *Dictyosoma elsa,* which STANDARD took for the first time in 1948, and then only one specimen. Then no more until 1951 when 4 were captured, and this year 4 more were taken and a couple more were seen. In the Sandia Mts. the PRESTONS found *Neophasia menapia* and *Atlides halesus* fairly common at the Doc Long Picnic Area. All specimens were on cone-flowers in a dry stream bed. At Tree Spring Toboggan Area and Capulin Picnic Area, elevation 9500 ft. they found *Pieris napi* and *Euptychia henshawi.*

UNUSUAL RECORDS

The most interesting and unusual records were for the reappearance of *Euphydryas bernadetta* in Wyoming and a hybrid *Hyalophora gloveri-cecropia* also captured by DOWNEY. Brother RENK, collecting on the Russian Olive trees at Regis campus, took *Libytheana bachmanii* and *Agraulis vanillae.* Also at Fraser he took another specimen of *Oeneis jutta reducta.* My best capture for this state was a couple of females of *Apodemia mormo* taken in Poudre Canyon. The PRESTONS also took one in South St. Vrain Canyon, Boulder County, on August 1. And on Loveland Pass, they took 10 males and a female of the form "brucei" among 70-some *Erebia epipsodea.* It is well to note that he collected these *E. epipsodea* at an approximate elevation of 11,900 ft., which is 3000 ft. higher than they usually are to be found. Neither do I know of any other passes where it is to be found at this elevation. STANDARD'S records of *Dictyosoma elsa* were at Vaughn and Belen, New Mexico.

Contributors: DUKE DOWNEY; J. D. EFF; F. W. and JUNE D. PRESTON; J. J. RENK; O. D. STANDARD.

820 Grant Street, Boulder, Colo., U.S.A.

4. GREAT PLAINS—TEXAS AND EASTERN PLAINS OF ROCKY MOUNTAIN STATES TO SASKATCHEWAN AND MANITOBA

by H. A. FREEMAN

The only report from Canada was received from C. S. QUELCH, who indicated that climatic conditions were about normal for that part of the country and that Lepidoptera were about normal as to appearances. WILLIAM H. HOWE reported the best collecting season in a long time, due to the fine collecting weather that prevailed over eastern Kansas during most of the summer. In the southern part of Area 4 conditions were far below normal due to the rather peculiar weather that we had here in Texas. The spring was wet and cold and then the rains stopped entirely; this resulted in one of the driest years we have ever experienced here. I have never seen such poor collecting in the Dallas area, or in the southwestern part of the state, or down along the lower Rio Grande Valley.

NORTH

QUELCH reported from Transcona, Manitoba, as follows: The winter temperatures were normal but there was very little snow. April was an exceptionally warm, dry month, and I was taking noctuids and geometrids at the light in good numbers by April 22. May was cool and dry, and the moths ceased flying in any numbers till the middle of June, when they were again in fair numbers except Saturniidae which did not come to the light. *Hyalophora cecropia, Automeris io, Anisota stigma,* and *Antheraea polyphemus* were present in good numbers in 1949 but had been getting more scarce during 1950-51. This spring I took only one Saturniidae, a male *A. polyphemus.* Butterflies were still scarce on the whole much as in 1951, with a few exceptions: *Vanessa cardui* appeared in swarms on June 3, mostly worn specimens; no fresh ones appeared later in the season. *Pieris occidentalis* was present in good numbers around August 1. *Oeneis macouni* I found fairly common in the sand lands June 1 and 8. *Colias eurytheme* and all *Speyeria* were more plentiful than in 1951, although still not at all abundant. *Strymon edwardsii* was abundant locally. *Lycaenopsis pseudargiolus* var. "marginata" was in fair numbers near the Winnipeg River at Lee River Falls and also at Transcona. Forms that were better than during 1951 but still scarce were *Glaucopsyche lygdamus, Pieris napi, Boloria toddi, Vanessa milberti.* Many usually common species were still very scarce or entirely absent, including *Papilio glaucus, P. polyxenes, Plebeius melissa, P. scudderi,* all *Erynnis, Phyciodes nycteis,* all *Strymon* except *S. edwardsii.* On the whole collecting was better than during 1951.

MIDDLE

WILLIAM H. HOWE, Kansas City, Kansas, submitted the following report from that section of the country.

We have just experienced the best collecting season in many years here in eastern Kansas. The long, hot summer undoubtedly contributed greatly to the excellent collecting. Spring was very warm and dry and June was extremely hot and dry, but July, August, and September were cooler and had normal rainfall.

It was an excellent season for swallowtails. *Papilio glaucus, P. marcellus,* and *P. cresphontes* were very numerous at Baldwin Hill in the last two weeks of July and the first week in August as they frequented the purple Ironweed blossoms. I have never seen *P. marcellus* so common as they were this summer at Baldwin Hill. In the last two weeks of June we collected *P. philenor, P. marcellus,* and *P. polyxenes* on the Butterfly Weed which bloomed luxuriantly in Mear's Park in Franklin County. Excellent flights of *Anthocaris genutia* were observed at the park in early May. *Papilio marcellus* and f. "telamonides" was abundant at Baldwin Hill by May 5, as was *P. glaucus* and *P. polyxenes. Incisalia henrici* was observed April 21 in Wyandotte County. *Speyeria cybele* and *S. idalia* were both substantially reduced from last year. *Eurema nicippe, E. mexicana, Nathalis iole,* and *Zerene caesonia* were all present this year but not very commonly. Exceedingly abundant was *Phoebis sennae* and *Eurema lisa.* Greatly reduced in eastern Kansas this year was *Danaus plexippus.*

We had the best season of all with our bait and chemical traps. Traps baited with fermented bananas, beer, sugar, and molasses brought in a large quantity of *Limenitis astyanax, L. archippus, Asterocampa celtis, A. clyton, Libytheana bachmanii, Polygonia interrogationis, Vanessa atalanta, V. virginiensis, Anaea andria, Megisto eurytus, Cercyonis alope,* and a few *Lethe portlandia* and *Nymphalis antiopa.* One rarity entered the traps on July 16, a fresh male specimen of *Neonympha gemma* which substantiates the new state record set for it by HOFFMAN in 1946.

In Kansas City, Kansas, *Agraulis vanillae* was unusually abundant throughout August and early September. I secured an abundance of the spiny, salmon colored caterpillars which, incidentally, had to be searched for after the sun had set; there was never one to be found in daylight hours on the Passion Vines.

We report an unusually good season for moths also with some rarities received. A tropical moth, *Erebus odora,* was caught on August 15 in Ottawa in unusually good condition. A perfect male *Aellopus titan* was collected by Mrs. W. D. BANCROFT on June 25 in Ottawa, which was the sphinx rarity for the season. The hot summer may have been conducive to these unique captures. Sphingidae taken in traps were: *Sphecodina abbotii, Amphion nessus, Ampeloeca myron,* and *Xylophanes tersa.* Others caught this year were *Sphinx chersis, Pachysphinx modesta, Ceratomia kansensis* (Kansas City, Kans.), *Pholus pandorus, P. achemon, Hemaris diffinis, H. thysbe* (Kansas City, Kans.), *Isogramma hageni, Paonias excaecatus,* and *Smerinthus jamaicensis.* Among the Ceratocampidae *Adelocephala bicolor* was rather abundant, but *A. quadrilineata* was seemingly absent.

Catocalinae responded well to the bait traps, the following species being attracted: *Catocala walshii, C. insolabilis, C. angusi, C. cara, C. innubens, C. illecta, C. epione, C. amatrix, C. agrippina, C. grynea, C. whitneyi, C.*

titania, C. jacquenetta, C. maestosa, C. consors, C. neogama, C. piatrix, C. amica, C. abbreviatella, C. nuptialis, and *Euparthenos nubilis.* Two scarce Underwings which were collected at Baldwin Hill last year, *Catocala nebulosa* and *C. palaogama,* were not observed this year, nor was *C. parta* or *C. muliercula.*

The rare butterfly catch for the year was a single male specimen of *Chlosyne lacinia adjutrix,* collected by JAMES HOFFMAN on August 6 in Ottawa, Kansas.

Information received from DON B. STALLINGS, Caldwell, Kansas, suggests that collecting in the southern part of Kansas was below par due to the absence of rain during the most of the summer.

SOUTH

During February I collected a number of larvae of *Megathymus yuccae* in *Yucca arkansana* in Dallas, Cedar Hill, and De Soto, all in Dallas Co., most of which hatched during March. This was the first year that I had been able to locate larvae of that insect in this area even though I had collected adults for a number of years. Two specimens of *Euchloe olympia* were collected in Dallas during March; these were the first that I had taken of this species in that area. *Incisalia henrici* appeared on the wing but was very rare as compared with past seasons. Other spring fliers normally present were scarce or absent.

Two collecting trips were made to Tyler during March with the hopes of getting specimens of *Incisalia hadros* but weather conditions were very poor for butterflies and no specimens were observed of that species. Five *Megathymus yuccae,* in the larval stage, were dug out of the roots of *Yucca louisianensis* in Tyler State Park. While returning from Tyler I stopped at Canton and found one larva of *M. yuccae* in the roots of a *Yucca freemanii* and it eventually hatched into a fine female specimen. There were no specimens of *Hesperia metea* in their usual place in Tyler State Park and the *Papilio* species such as *P. polyxenes, P. philenor,* and *P. glaucus* were conspicuous by their absence.

Summer collecting around Dallas was very poor, as the drought had set in and continued into the winter months. There were no specimens of *Cogia outis* in their usual place near Vickery and the usual number of *Amblyscirtes* were practically absent. Few Swallowtails were in evidence; only once in a while would you see a specimen of *P. cresphontes.*

From August 8 to 10 I was in the Alpine—Ft. Davis area and found the vegetation there greener than I had ever seen it before. There were several species in evidence that had previously been rather scarce, namely *Minois meadii, Amblyscirtes aenus,* and a few specimens of *Strymon polingi* which is the first evidence that this species is double brooded. On the 10th I went to the Chisos Mountains and found three larvae of *Megathymus chisosensis* and some larvae of *M. mariae.* The year before I had looked for *M. mariae* larvae in that area but had not been able to locate any. The three specimens of *M. chisosensis* emerged in September and October. Lepidoptera in general were scarce in the Big Bend section of Texas.

During August I collected around New Braunfels for a day on my way to the south part of Texas and found little on the wing. There were no specimens of *Lephelisca rawsoni* to be found, although a small series of *L. australis* was collected. I again visited the spot east of San Antonio to get more larvae of *Megathymus smithi* and found more there than last year. Around Laredo a few larvae of *M. yuccae* were dug out of the roots of a *Yucca* that I believe to be *constricta.* Near Mission another colony of *M. smithi* was discovered. Collecting in the Rio Grande Valley was somewhat below normal as the dry weather had also bothered that part of the state. Three or four more colonies of *M. smithi* were found between Kingsville and San Antonio, indicating that this species is fairly abundant in local areas.

The fall months failed to bring out the usual species around Dallas. The fall rains did not start in until November and by that time all of the flowers were gone and thus it was not possible to collect things that I have usually collected here.

EDWARD C. WELLING, Euclid, Ohio, dropped me a note that he had some records from the Ft. Worth area for the past season. Among the butterflies he found *Asterocampa celtis, A. clyton,* and *Thorybes pylades.* Moths reported were *Plusiodonta compressipalpis, Drasteria erechtea,* and *Cirrhobolina mexicana.* All specimens were collected during June.

Contributors: H. V. DALY; H. A. FREEMAN; W. H. HOWE; L. H. HULBIRT; C. S. QUELCH; W. J. REINTHAL; D. B. STALLINGS; E. C. WELLING.

1335 Overhill Drive, Garland, Texas, U.S.A.

5. CENTRAL — MISSOURI TO WEST VIRGINIA, NORTH TO ONTARIO

by P. S. REMINGTON

Considering the concentration of Society members in this zone, the total of 23 reporting on their season's observations is not impressive and is less than the number for last year. However, a few members reported in great detail. The zone coordinator earnestly urges all active collectors to keep a field record during the year and to send it in at the end of the collecting season in order that the Season Summary may gain in value to future students of Lepidoptera as the years continue.

Reports vary as to kind of year 1952 was. In the northern states after a severe winter the season started normally with the usual succession of species, but then a long dry spell set in which reduced collecting in some areas. In the south, the year seemed to be about as usual, although even there a prolonged hot spell existed in June and July. Several collectors reported the best year they have ever seen, both as to numbers of species and quantities.

ONTARIO

Although many members of the Society undoubtedly attended the Annual Meeting at Ottawa in July, only 2 members, F. R. ARNHOLD and G. R. WREN, reported on the collecting there. At Espanola on June 30 ARNHOLD caught *Colias interior, Limenitis arthemis, Speyeria atlantis, Boloria selene, Melitaea*

harrisii, Lethe portlandia, Pieris napi, and he saw *Danaus plexippus* at Blind River. Both ARNHOLD and WREN took nice series of *Lycaena epixanthe* at Mer Bleue Marshes near Ottawa. WREN also took *Polygonia faunus, Limenitis arthemis, Pieris napi, Feniseca tarquinius, Vanessa atalanta.* He saw thousands of larvae of *Nymphalis antiopa* on willows.

EARL G. BAILEY of St. Catharines found 1952 to be a good collecting year, with all the common species occurring on schedule. He reports fully on the increase in abundance of the European Skipper, *Adopaea lineola,* which he says "flew in mass quantities in their special favorite haunts". He was able to collect from 243 to over 400 specimens daily in an area not exceeding 1000 square feet between June 15 and July 6. This is the species which Bailey has taken in four previous years, but was misidentified and reported in the 1950 summary as *Atrytone arogos.* In company with RONALD LEUSCHNER he also collected within an hour over 170 specimens of *Strymon liparops* at Rockway, near St. Catharines on the Niagara Peninsula. This species was feeding on White Sweet Clover and was so intent on the feast that it could be collected by being merely tapped off the bloom by hand into a cyanide jar. This was a notable concentration of a rather rare species.

MINNESOTA

ARNHOLD collected here in June, August, September, and October. No Lepidoptera seen around Albert Lea in May as weather was cold and rainy. Near Rushford he caught one *Danaus plexippus* on June 3, male, fresh, and saw *Colias philodice* and *Epargyreus clarus.* On June 6 *Vanessa cardui* and *Colias philodice* were plentiful at Twin Lakes. *Pieris rapae* was common here in August. Clover and alfalfa fields were swarming with *Colias philodice* on August 7 at Twin Lakes. In September he saw *Pyrgus communis* and *Pieris rapae* at Twin Lakes and on October 31, *Colias eurytheme* was still flying there. Severe defoliation of deciduous trees by Forest Tent Caterpillars was reported from northern Minnesota.

SAM M. COX of Duluth was unable to collect personally, but sent some reports put out by the State Entomologist's office on the current outbreak of the Forest Tent Caterpillar, with maps. These show the infestation covered almost the entire upper half of the state in 1952, an alarming increase over 1951. Eleven million acres of land were infested and the prediction for 1953 is much heavier. Property owners are advised to spray with DDT.

WISCONSIN

Four collectors reported from this state. SIEKER found the spring wet and cool with little collecting until the middle of June around Madison. No *Euchloe olympia* were seen this year, but he saw about a dozen *Glaucopsyche lygdamus* in May. No Sphingids were found until late June in Door County. Then *Ceratomia undulosa* was common at light. Also present were *C. amyntor, Paonias excaecata, P. myops, Sphinx kalmiae, Smerinthus cerisyi, S. geminatus.* Best catch in Sphingids was *Sphinx canadensis,* the first in ten years, and one *S. vancouverensis.* Of the butterflies, *Lycaena thoe, L. dione, Strymon acadica* were seen in June in Door County. *Limenitis arthemis* was the most common in several years. *Colias interior* reappeared after several years'

absence. Hesperiidae were common in July and *Papilio* more common than in recent years. The fall was extremely dry and cool and little of interest was out.

SIEKER reports this to be the best year for *Catocala* in many years. Other collectors found this to be true also. The scarcity of Saturniids continues. In the Madison area he took one rarity, *Erebus odora,* in July. Species of *Catocala* include: *ilia, parta, cerogama, coccinata, unijuga, ultronia, abbreviatella, micronympha, piatrix, neogama, grynea, retecta, amatrix, cara* (rare now where it used to be common), *obscura* (a new record for Wisconsin), *paleogama, concumbens, subnata* (new to Sauk County), *nuptialis, habilis, semirelicta.*

GRIEWISCH reporting on the Green Bay area writes that weather conditions were very wet and cool in June, July, and August, while September and October were very dry. Many species ordinarily seen were not seen this year because of the rainy weather. The only common Hesperiid was *Atrytone ruricola;* rarities taken were *Amblyscirtes vialis* and *A. hegon.* Scarce were *Atrytone logan, Epargyreus clarus, Thorybes pylades, Carterocephalus palaemon, Poanes hobomok, Polites peckius, P. mystic, Hesperia metea, H. leonardus, H. manitoboides, Erynnis brizo, E. juvenalis.* Fairly common were *Pieris napi, Lethe portlandia.* All *Speyeria* were very scarce this year, also *Limenitis arthemis* and *Papilio glaucus. Colias interior* was missing, although abundant last year. *Plebeius saepiolus* was scarce, but *P. scudderii* more numerous than he has ever seen them. Notable catch was one pair of *Oeneis chryxus strigulosa.* Good series of *Euchloe olympia* were taken in Marinette County. *Lethe eurydice* and *Cercyonis pegala nephele* were common, but *Boloria toddi* and *B. selene* scarce. Summing up, GRIEWISCH found the season to be rather topsy-turvy: species usually scarce were common this year; those usually common were scarce.

F. R. ARNHOLD, writing from Chippewa Falls in the northwestern part of the state, reported a severe winter going down to 34° below zero and snowfall about double normal. There was a great blizzard on April 13 followed by a record breaking heat-wave the last two weeks of April, with temperatures as high as 90°. *Lycaenopsis pseudargiolus* was on the wing on April 20, although some snow drifts still present. *Pieris napi* was taken in late April, *Colias philodice* in early May, *C. eurytheme* in late May. No *Euchloe olympia* or *Pieris protodice* were seen this spring. On May 31 a southwest to northeast migration of *Vanessa cardui* was seen by Arnhold. It continued for several days. "Observed about 100 per hour passing through a 200 foot wide path flying at high speed, approximately 25 miles per hour. Almost impossible to catch, they seemed to be fairly fresh and rarely stopped to feed. One female was caught."

In late June a second brood of *Pieris napi* appeared, also a second brood of *Colias philodice* was common in the middle of July. On August 18 about 40 *Colias philodice* were seen around a mud puddle with *Pieris napi*—all males. In September a number of *Nymphalis milberti* were observed. "Caught on bait from night before were *Nymphalis antiopa, Polygonia interrogationis, P. comma,* and *P. gracilis.*"

S. E. ZIEMER of Kewaunee collected only locally, but extensively. His observations mention enormous numbers of *Vanessa cardui,* with large areas of thistle and burdock fairly crawling with caterpillars. Other butterflies which were very common were: *Pieris rapae, Colias philodice, Danaus plexippus, Polygonia comma, Nymphalis milberti, N. antiopa, Phyciodes tharos, Everes comyntas, Vanessa atalanta.* Butterflies which appeared in normal numbers were: *Limenitis arthemis, L. archippus, Lycaena thoe, Cercyonis alope nephele, Lethe eurydice, Euptychia cymela, Polygonia progne, Eurema lisa, Colias eurytheme, Strymon acadica, Papilio polyxenes.* Scarce this year were: *Boloria selene, Speyeria cybele, S. aphrodite,* and most Hesperiidae. For the fifth year no *Euphydryas phaeton* were seen.

In moths, Saturniids and Arctiids were abundant, Sphingids normal, also Geometrids and Noctuids, with the exception of *Catocala,* which appeared sparingly at bait.

MICHIGAN

Ten collectors reported from this state, the best response of the Zone. RALPH BEEBE from Ecorse recorded a dry season with Lepidoptera scarce, perhaps partly due to extensive building and to indiscriminate spraying with DDT. As usual, *Nymphalis antiopa* was the first species to appear—April 26. *Danaus plexippus* seen on June 5, but was not common this year and no noticeable fall migration. One *Eurema lisa* seen on August 17, a rarity here. *Pieris rapae* and *Colias eurytheme* flew until November 5. Moth collecting was very poor. A new state record was *Pterophorus balanotes* on June 12.

Mrs. VONTA HYNES writing from Battle Creek was not able to be as active in collecting as in the past.

EDWARD VOSS, collecting in three widely separated counties, one on the Upper Peninsula, reports two unusual catches, *Eurema lisa* and *Precis lavinia coenia. Strymon falacer* and *S. liparops* were common in July in Cheboygan County. *Coenonympha tullia* was a new record for that county. *Colias interior* continued common. *Vanessa cardui* was extremely abundant, and *Limenitis arthemis,* approaching *astyanax,* more numerous than usual. HOWELL V. DALY of Dallas, Texas, and W. H. WAGNER, JR., of Ann Arbor, collaborated with VOSS in this report. GEORGE WREN also collected in Eaton County in May. Species observed or taken include *Pieris rapae, Colias philodice, Polygonia interrogationis, Papilio polyxenes, P. glaucus, Limenitis archippus, Danaus plexippus, Phyciodes tharos, Pholisora catullus.*

FRANK N. YOUNG collecting in Livingston County found *Euphydryas phaeton* and *Boloria selene* along the edges of swamps at Pinckney in late June, also *Speyeria atlantis, S. cybele, S. idalia, Vanessa cardui.* The late summer was very dry, and few insects were flying.

M. C. NIELSEN again reported very fully on collecting from the northern tip of the Upper Peninsula to the Ohio line in Lenawee County. At Copper Harbor in August he collected, by using a flashlight around Joe-Pye weed at dusk, *Autographa rectangula, A. brassicae, A. bimaculata* and other Noctuidae, including one fine *Catocala unijuga.* Sugaring yielded *Catocala briseis*

and other Noctuidae. At Isle Royale in late July species observed included *Speyeria cybele* and form "krautwurmi", *S. atlantis, Limenitis arthemis, Colias interior, Vanessa cardui, Precis lavinia coenia, Nymphalis antiopa,* and *Hesperia laurentina.* Near Nawbinway in early August he took a fine series of *Lycaena dorcas* in a bog and also *Nymphalis j-album, Pieris napi,* and one *Polygonia satyrus.*

At Luzerne on June 22 NIELSEN and JOHN NEWMAN found good collecting which included *Boloria selene, Phyciodes tharos, P. batesi, Papilio glaucus, Melitaea harrisii, Colias interior, Plebeius saepiolus, Incisalia polios, Lycaenopsis argiolus, Erynnis martialis, E. icelus, Hesperia sassacus, H. metea, Polites peckius, P. mystic, Poanes hobomok* and form "pocahontas", *Atrytonopsis hianna, Amblyscirtes vialis.* In the evening a lighted sheet overlooking the creek attracted *Odontosia elegans, Datana* sp., *Habrosyne scripta, Halisidota caryae, Smerinthus cerisyi, Paonias excaecata. Darapsa pholus* came to bait.

On May 18 near Baldwin NIELSEN found *Hesperia metea, Incisalia polios, I. augustinus, I. niphon, Oeneis chryxus, Erynnis brizo, E. juvenalis,* all taken in open pine plains. In Montcalm County on May 7 five *Glaucopsyche lygdamus* were taken at the edge of a swamp. On May 22 here he observed a female *Erynnis lucilius* ovipositing on wild Columbine, tagged the plant containing one egg and returned later to take the larva, which produced a perfect imago. Also in this area he saw *Erynnis juvenalis* and *E. icelus; Lycaena hypophlaeas* was abundant. Additional species included *Polygonia comma, Melitaea nycteis, Lethe portlandia, L. eurydice, Speyeria aphrodite, Strymon titus, S. acadica, Atrytone logan, Wallengrenia otho,* and *Thorybes pylades.* A week later he took a fine series of *Strymon edwardsii, S. acadica,* and *S. titus.* On one large clump of *Ceanothus americanus* he counted over 30 *Strymon edwardsii, S. titus*, and one *Lycaena helloides.* In the same area were *Atrytone conspicua, Polites verna, P. themistocles, P. manataaqua, Pholisora catullus, Nymphalis milberti.* Unusual captures on Sept. 4 were *Strymon melinus* and *Atrytone logan,* very late for both. Collecting here in June at night with lights, NIELSEN took single gravid females of *Prionoxystus robiniae* and *Cossus centerensis,* as well as *Actias luna, Anisota rubicunda, Ceratomia amyntor,* and the nuisance *Malacosoma americana.*

In Ingham County on July 5 NIELSEN took a fine series of *Poanes viator* in a swamp, as well as *Atrytone logan, A. dion, Euphydryas phaeton, Speyeria cybele, S. aphrodite, Strymon titus, S. acadica, S. liparops, Atrytone ruricola.*

In Washtenaw County on July 6 NIELSEN and NEWMAN collected the rare *Euptychia mitchellii.* All were taken in shade and only 7 were collected, in order not to exterminate this small colony, which is very local. *Poanes massasoit* was also taken in this swamp.

In Lenawee County, near the Ohio line, NIELSEN collected one *Papilio marcellus,* also *Asterocampa clyton, Strymon liparops, Limenitis archippus, Libytheana bachmanii.* In August *Euptoieta claudia* was common, with two *Papilio marcellus, Precis lavinia coenia,* and *Papilio polyxenes.* He saw one *Speyeria idalia* female. Sugaring on August 30 produced *Catocala cara, C. amatrix, C. hinda* and many other Noctuids.

R. W. HODGES also sent a fine report of his collecting in central Michigan and two days in the Upper Peninsula. He collected a total of 64 species of butterflies. Unusual captures were: *Speyeria aphrodite alcestis* (one female on July 12, the first in 4 years); *Melitaea nycteis; Limenitis astyanax*—two broods in Clinton County, June 5-22 and July 19-28; *Lephelisca muticum* (more numerous than in '51); *Erynnis brizo* (first seen in many years); *Erynnis martialis; Poanes massasoit* (one fresh male, July 19—first seen in 4 years); *Asterocampa clyton* and *A. celtis* near Lansing in July. He reports that the European Skipper, *Adopaea lineola,* introduced into this country many years ago, seems to be spreading westward, for he took it this year in Barry County on July 6. At the same time he took one female *Hesperia pawnee,* a new state record. Collecting at West Ishpeming in the Upper Peninsula on July 26-27 he took, among other things, *Polygonia satyrus, P. faunus, P. progne, P. gracilis, Boloria toddi.* He noticed that *Vanessa cardui* was more abundant than ever before. Also seen were *Colias interior, Pieris napi, Hesperia laurentina.* As a whole, Hodges found the season above average. Spring started two weeks early. The rainfall was light from May to July, but did not seem to affect the butterflies. Species formerly caught but missing this year were *Speyeria idalia, Feniseca tarquinius, Libytheana bachmanii, Papilio cresphontes, P. marcellus, Eurema lisa, Erynnis lucilius.*

IOWA

The only collector reporting on this state was LEONARD S. PHILLIPS of Chicago. On July 26, at Leclaire in Scott County he took: *Libytheana bachmanii, Vanessa virginiensis, V. cardui, V. atalanta, Limenitis astyanax, Polygonia interrogationis, Speyeria cybele, Asterocampa clyton, Melitaea nycteis, P. tharos, Junonia coenia, Lycaena thoe, Lycaenopsis pseudargiolus, Everes comyntas, Pieris protodice, P. rapae, Colias eurytheme, C. philodice, Pappilio glaucus, P. polyxenes, Thorybes bathyllus.* August 20 at Cedar Falls, besides most of the above, *Limenitis archippus, Nathalis iole, Eurema lisa, Pyrgus communis, Phoebis sennae, Speyeria cybele, Ancyloxypha numitor;* August 31, at the same spot he added *Nymphalis j-album, Phyciodes batesii, Boloria selene, Strymon melinus.*

MISSOURI

The zone coordinator reports that the year was quite good in this area, more like the "old-fashioned years" we had ten years ago. This may have been due in some measure to the heavy snowfall in late 1951 and early 1952.

We had 11 inches of snow on November 6th, an all-time record for St. Louis, and many other heavy snows later. Spring was somewhat late, the first butterfly seen being a hibernated specimen of *Nymphalis antiopa.* He appeared the same day as our first robin, March 17. No more collecting until March 29 when the sunny weather returned. Hibernated specimens of *Polygonia progne, Anaea andria* appeared and several fresh *Pieris rapae* and *Erynnis brizo.* On April 8 the temperature went to 81° in St. Louis, and *Pieris rapae* appeared in the city parks. The next day the temperature dropped 43 degrees, the greatest 24 hour fall in the history of the weather bureau.

There was cold and rainy weather then until April 18, when *Vanessa atalanta* and *Papilio glaucus* were seen in the city. In the next two weeks all the spring species, some of which have been missed for several years, appeared in St. Louis County. At Kirkwood *Incisalia henrici* was taken, also *Erynnis brizo, E. juvenalis, Everes comyntas, Lycaenopsis pseudargiolus,* and a worn female *Danaus plexippus,* indicating a migrating individual coming north. At Ranken on the same day and also a week later *Euchloe olympia* reappeared after a scarcity of several years, also *Anthocaris genutia, Erynnis persius, E. martialis,* four female *Danaus plexippus, Vanessa cardui, Papilio polyxenes, P. philenor* (small spring form), *P. glaucus, P. marcellus* (small spring form), all *Papilio* fresh. We saw many *Mitoura gryneus* flying around the tops of Red Cedar trees. One spring species which has not yet been recovered this area, although search was made for it, is *Strymon ontario.* I was away from the area in late June and July, so cannot say what the terribly hot spell did to the Lepidoptera. The late summer and fall species seemed abundant and flew until very late. There was a semi-migration in October of *Phoebis sennae* (all observed were fresh males) flying through St. Louis in a southwesterly direction, never stopping. Density perhaps 12-20 per hour on bright days. After a cold snap or two in early November, warm weather returned and *Colias eurytheme* and *Vanessa virginiensis* were seen on November 16, temperature 76°F. Soon after this, killing frosts stopped observation. It will be interesting to see whether the prolonged hot, dry summer affects the procession and quantity of species next summer.

ILLINOIS

WOODCOCK, HAYES, and PHILLIPS were the only ones reporting this year, all from the Chicago area. WOODCOCK'S observations concern moths entirely. The extremely erratic temperatures affected some species, causing *Pyrausta* to be scarce, even the common species. The smaller micros were noticeably scarce in number. In the larger moths, *Crymodes devastator* was less common than usual, but *Pseudaletia unipuncta* was more plentiful than usual. *Catocala grynea* taken at light. The season was definitely not so rich in species of moths coming to lights as any of the past three. However, some species appeared for the first time: *Agriopodes teratophora, Hormisa litaphora, Apamea americana.* One possibly storm-blown capture was *Dioryctria auranticella.* WOODCOCK records the late fall as cool and dry with lowest temperature average since 1925, killing frost October 6, record breaking snow on October 20. Yet he observed *Pseudaletia unipuncta* November 1, *Plathypena scabra* all October and early November (this species hibernates and may be seen flying in January), *Agrotis ypsilon* November 6. This indicates that many moths can withstand extremes of temperature.

JOSEPH B. HAYES reports the best collecting he has ever had and sent a 9-page diary of species observed and weather conditions. The first butterfly seen was *Nymphalis antiopa* (April 8), followed in 10 days by *Papilio glaucus, Pieris rapae,* and May 1 a *Smerinthus jamaicensis.* May was cool and rainy, with little activity seen. By June 5, the weather turned hot and humid, and the summer species came out in numbers. *Apantesis vittata* was plentiful at light all month, *Diacrisia virginica* on June 15, *Speyeria cybele* in early July was very numerous. *Pieris rapae* was common from April 20

through season to November 13. In July *Haematopsis grataria, Adelocephala bicolor, Autographa brassicae, Diacrisia virginica* were taken at light. In late July at Evergreen Park he took, among other species; *Speyeria idalia, Junonia coenia, Lycaena thoe, Zerene cesonia, Hemaris diffinis.* On willow, he found larvae of *Nymphalis antiopa, Datana ministra, Antheraea polyphemus, Hyalophora cecropia, Automeris io, Smerinthus jamaicensis,* and on grape vine numerous larvae of *Alypia actomaculata.* Commonest Hesperiids were *Pholisora catullus, Ancyloxypha numitor, Epargyreus clarus, Polites peckius. Celerio lineata* was common feeding on flowers at dusk in August. *Haematopsis grataria* continued to be very numerous at light all through August. In late October although temperatures went down to 38°, on sunny days *Colias philodice, Pieris rapae, Junonia coenia* were seen up to November 16.

LEONARD S. PHILLIPS also sent a very full report. From May 30 to June 1, he collected at Ramsey, Fayette County. Skippers were very numerous, at least nine species being observed. One of these seems doubtful as to identification, *Thorybes confusus.* It would be well to check this carefully, as it is usually reported much further south. June 8, in the Chicago area, among other species, *Junonia coenia.* On June 15, *Euptoieta claudia, Lycaena thoe, Eurema lisa, Pholisora catullus,* and others. June 22, *Lycaena xanthoides* was collected, and *Zerene cesonia* made its appearance. July 20, Ottawa Forest Preserve, he took *Limenitis astyanax, Speyeria aphrodite, Boloria selene, Polites verna.* August 3, an added species, *Hylephila phylaeus,* was taken and continued to appear until October. August 20 he captured at fluorescent light in the laboratory, Illinois Institute of Technology, Chicago, a specimen of *Nymphalis j-album.* Continued collecting into late September and early October added *Polygonia progne* and another brood of *Lycaena thoe.*

INDIANA

GEORGE WREN, collecting in the vicinity of Gary, reports a mild and early spring in which the first butterflies seen were *Euchloe olympia* in the sand dunes on April 17, and flying commonly until May 4. The summer was extremely dry—the worst drought in years. Along dry sandy roads *Junonia coenia* were very common. This appears to be a species that thrives in dry weather. *Limenitis archippus* was also extremely common. No spectacular Monarch migration was observed, but a few stragglers were seen flying due west in Gary on September 20 and 21. *Colias eurytheme* seen up to November 16. Wren reports a total of 38 species of butterflies seen near Gary during the season.

JOSEPH HAYES collected at Schererville on July 13 and found three *Speyeria* very numerous, *S. cybele, S. aphrodite, S. idalia.*

OHIO

Only one member reported from Ohio this year, but his report was almost a monograph. Seldom have we seen such complete & extensive field notes. They should serve as a reservoir of information for future students of distribution records. EDWARD WELLING of Euclid reported on each species for every day in every locality observed, mostly northeastern Ohio, Lake and Geauga Counties. He also included observations by FRANK LUCAS

at Byesville, RICHARD KLEIN at Chagron Falls, Solon & Streetsboro, JOSEPH LINDIC in Cleveland, JOSEPH PRESKAR at Euclid. 59 species of butterflies and 244 species of moths were observed and reported on fully. Space is not available for more than a summary of his report. He found the season rather dry, July especially excessively hot and humid. August was rainy and cool, but September and October were dry again. November was cool and warm intermittently. WELLING captured for the first time *Euptoieta claudia, Feniseca tarquinius, Libytheana bachmanii, Erynnis icelus, Hesperia leonardus.* Scarcer than usual were *Polygonia comma, Papilio glaucus, Thorybes bathyllus, T. pylades, Erynnis horatius, Polites themistocles, Poanes hobomok.* Commoner than usual were *Speyeria cybele, S. aphrodite, S. aphrodite alcestis, Precis lavinia coenia, Vanessa cardui, Strymon melinus, S. titus, Eurema lisa, Papilio troilus, Pholisora catullus, Hylephila phyleus, Polites manataaqua, Atrytone dion.* Entirely absent were *Euphydryas phaeton, Melitaea nycteis, Melitaea harrisii, Lethe eurydice, Euptychia mitchellii, Strymon liparops, Papilio marcellus, Achalarus lyciades, Atalopedes campestris, Atrytone bimacula, A. conspicua, Erynnis juvenalis.*

In his 1951 report WELLING noted the discovery of two uncommon Hesperiids, *Atrytone dion* and *A. conspicua* in a small patch of grass, 75 feet by 15 feet in Euclid. This year *A. conspicua* was missing, but *A. dion* was found elsewhere in Euclid, mainly on *Asclepias.* WELLING finds, as most of us do, that the trend to suburban building development is annihilating many of his favorite collecting spots.

WELLING collects moths much more diligently than most of those reporting. This year he caught for the first time *Celerio lineata, Sanninoidea exitiosa, Arctonotus arcuata, Schizura unicornis, Apantesis anna* form "persephone", *Eubaphe aurantiaca* (previously form "rubicundaria" only), *Haploa confusa, Tortricidia testacea.* Moths commoner than usual in the Lake Erie region were *Antheraea polyphemus, Leuconycta leucostigma, Anaphora popoanella, Anisota rubicunda, Nerice bidentata, Hyphantria cunea, Eubaphe aurantiaca* form "rubicundaria," *Euchaetias oregonensis, Phragmatobia fuliginosa* (usually non-existent), *Cochlidion biguttata, Yponomeuta multipunctella* (perhaps thousands to the acre in the forests). Scarcer than usual were *Ampelophaga pholus, Amphion nessus, Paonias myops, Hemaris thysbe, Phlegethontius sextus, P. quinquemaculatus, Tolype velleda, Isia isabella, Pyrausta pertextalis, Pyralis farinalis.*

WELLING had extremely good success in sugaring for Noctuidae. The list of *Catocala* he took includes *C. ilia* f. "osculata" and "uxor", *C. parta, C. relicta, C. ultronia, C. unijuga, C. grynea, C. vidua, C. cara, C. concumbens, C. innubens, C. cerogama, C. nebulosa, C. amatrix, C. obscura, C. neogama, C. piatrix, C. subnata.*

KENTUCKY

JAMES R. MERRITT sends the only complete report of collecting in this state. After a mild winter the spring butterflies appeared on schedule, but in fewer numbers than he has found previously. By March 12 *Nymphalis antiopa* and *Polygonia comma* appeared out of hibernation. By March 29 emerging butterflies appeared: *Erynnis brizo, E. juvenalis, Lycaenopsis argiolus,*

Papilio glaucus, P. marcellus, P. philenor, Pieris rapae, Colias philodice, Anthocaris genutia, Anaea andria, Euptychia gemma. One exception to the general scarcity was the large number of *Erynnis brizo* and *E. juvenalis* which were seen clustered around damp spots in a dry branch on April 9. MERRITT counted 67 *Erynnis* and 2 *Papilio glaucus* around one such spot and 45 *Erynnis* around another. Only one specimen of *Incisalia henrici* was seen this spring. MERRITT was pleased to find *Incisalia niphon* still present in a small tract of pine although the area was swept by a ground fire in 1951. *Vanessa cardui* appeared sparingly from June 12 on, the first since 1947.

In the late summer the season appeared normal. *Eurema lisa, Nathalis iole, Lycaena thoe,* and *Hylephila phyleus* were common. *Junonia coenia* was more abundant around Louisville than he has ever seen it. A rarity taken in Louisville this fall was *Atlides halesus,* the first seen since 1948. The latest seasonal record made by Merritt was a specimen of *Colias eurytheme* flying south very fast on December 7.

EDWARD WELLING sent a record of finding *Lagoa crispata* on June 27 at Covington.

Contributors: F. R. ARNHOLD; E. G. BAILEY; RALPH BEEBE; S. M. COX; H. V. DALY; L. W. GRIEWISCH; J. B. HAYES; R. W. HODGES; VONTA P. HYNES; R. LEUSCHNER; J. R. MERRITT; J. H. NEWMAN; M. C. NIELSEN; L. S. PHILLIPS; P. S. REMINGTON; WM. SIEKER; EDWARD VOSS; W. H. WAGNER, JR.; E. C. WELLING; H. E. WOODCOCK; G. R. WREN; F. N. YOUNG; S. E. ZIEMER.

5570 Etzel Avenue, St. Louis 12, Mo., U.S.A.

6. SOUTHEAST — FLORIDA TO LOUISIANA, NORTH TO ARKANSAS AND MARYLAND

by RALPH L. CHERMOCK

In the southeastern region, the winter of 1951 to 1952 was comparatively mild, followed by a warm, somewhat early spring. As a result, the spring flights of butterflies were above normal. However, the summer was characterized by a prolonged drought, coupled with above-normal temperatures. In many areas, this weather persisted into the autumn months. As a result, butterflies were comparatively rare during this period. In some areas, the autumn flights were nearly normal.

VIRGINIA

S. S. NICOLAY collected in the vicinity of Washington, D. C., on April 14, and found the following species on wing: *Incisalia henrici; I. niphon; Strymon melinus; Lycænopsis pseudargiolus; Anthocaris genutia; Papilio glaucus; Erynnis juvenalis* and *E. brizo.* This was followed by a period of drought and unusual heat for this time of year, which depleted their numbers. However, *Mitoura gryneus, Papilio polyxenes,* and *P. glaucus* apparently were unaffected by the unusual climate. A long rainy period closed the spring flights. During the first week of June, *Poanes zabulon, Polites peckius, P. verna,* and *P. manataaqua* were the only abundant species; *Speyeria cybele*

was just appearing, and *Atrytonopsis hianna* was nearing the end of its flight period. In the second week of July, *M. gryneus* and *Cercyonis alope* were fairly plentiful in typical scrub-pine and cedar-brush areas at Quantico, Virginia. Collecting in the area around Norfolk, Virginia, from June 14 to July 2, was characterized by a progressively poorer flight of butterflies because of increased heat and drought. *Papilio glaucus* and *P. marcellus* were common, while *Poanes viator* was rare. Other species collected were: *Lethe portlandia; Euptychia hermes; Danaus plexippus; Phyciodes tharos; Strymon melinus; S. cecrops; Everes comyntas; Lycænopsis pseudargiolus; Papilio palamedes; P. philenor; Pholisora catullus; P. hayhurstii; Erynnis horatius; Ancyloxypha numitor; Hylephila phyleus; Atalopedes campestris; Atrytone logan; A. dion; A. dukesi; A. ruricola; Lerema accius; Amblyscirtes textor; A. carolina;* and *Lerodea l'herminieri.*

CHARLES V. COVELL, collecting around Alexandria, Virginia, made the following observations. During March the following species were seen in order of their appearance: *Polygonia comma; Vanessa atalanta; V. virginiensis; Polygonia interrogationis; Everes comyntas; Nymphalis antiopa; Lycaena phlæas; Anthocaris genutia; Libytheana bachmanii; Eurema nicippe; Incisalia henrici; Strymon melinus; Colias philodice; C. eurytheme; Erynnis lucilius; Junonia cœnia; Atlides halesus; Strymon m-album;* and *Papilio marcellus.* By the end of March these were all in good flight. Normal flights apparently continued through April and May. June and July were characterized by a decreased flight, beginning to return to normal at the end of August.

P. S. REMINGTON collected the following species of moths at night on June 26 in Galax, Virginia: *Ecpantheria deflorata; Anisota rubicunda; Darapsa myron; Antheræa polyphemus; Euparthenos nubilis; Haploa colona;* and *Automeris io,* the latter being very common.

WEST VIRGINIA

S. S. NICOLAY collected in Pendleton Co., West Virginia, on May 5 and found the following species: *Boloria toddi; Polygonia comma; Incisalia niphon; Lycaena phlæas; Glaucopsyche lygdamus; Lycænopsis pseudargiolus; Feniseca tarquinius; Erynnis icelus; E. brizo; E. lucilius; E. juvenalis;* and *Amblyscirtes vialis.* He also collected the first specimen he has ever seen of *Erora læta* on a small mountain road, a freshly emerged female. On July 5, he again collected in this area and found the following species: *Atrytone bimacula; Cercyonis alope; Lethe portlandia; Euptoieta claudia; Speyeria atlantis; S. idalia; S. cybele; S. aphrodite; Boloria toddi; Polygonia comma; Strymon falacer; S. titus; Feniseca tarquinius; Lycæna phlæas; Lycænopsis pseudargiolus; Epargyreus clarus* (extremely common); *Polites verna; Wallengrenia otho;* and *Atrytone logan.*

NORTH CAROLINA

J. PRESKAR collected at Brevard, North Carolina, on July 6 and recorded the following species: *Everes comyntas; Halisidota tessellaris; Pseudaletia unipuncta; Prodenia commelina; Prochœrodes transversata; Antepione thisoaria;* and *Scopula limboundata.*

P. S. REMINGTON collected at the same locality from June 30 to July 8. The weather was extremely hot, and it appeared that the season was a week or two advanced over previous years. *Epargyreus clarus* was extremely common. The following species were also in flight: *Speyeria diana; S. aphrodite; S. cybele; Junonia cœnia; Limenitis astyanax; Papilio troilus; P. glaucus; Pieris rapæ; Polygonia faunus; Colias eurytheme; Lethe eurydice; Erynnis juvenalis; Polites themistocles;* and *Amblyscirtes vialis.*

JAMES R. MERRITT collected in Fontana Village, Graham County, North Carolina, on April 12 and 13. He noted that *Pieris virginiensis* was freshly emerged, and the commonest butterfly on wing. It was found fluttering everywhere through the leafless forest at altitudes of 1500 to 2000 feet. In addition, the following species were also collected: *Euptychia gemma; Danaus plexippus; Phyciodes tharos; Nymphalis antiopa; Polygonia comma; Strymon m-album; S. cecrops; Incisalia augustinus; Everes comyntas; Glaucopsyche lygdamus; Lycænopsis pseudargiolus; Papilio glaucus; P. troilus; P. marcellus; P. philenor; Colias philodice; Eurema nicippe; Epargyreus clarus; Erynnis icelus; E. brizo; E. juvenalis;* and *Amblyscirtes hegon.*

ROBERT BUTLER made the following notes on collecting at Southern Pines, Moore Co., North Carolina. He noted that the spring was normal for the region, but May and June were hot and fairly dry. In March, the following species occurred in larger numbers than in previous years: *Papilio marcellus; Incisalia niphon; I. henrici; Strymon m-album; Atlides halesus;* and *Lycæna phlæas.* All of the common species had normal flights. In April, the flights began to diminish and the following species were rarer than normal: *Papilio palamedes; P. polyxenes; Libytheana bachmanii;* and *Mitoura gryneus. Papilio glaucus, P. troilus, P. philenor,* the Pieridæ, *Hemaris thysbe,* and *H. diffinis* exhibited normal flights. In May *Limenitis astyanax* appeared, and *Euptychia cymela, E. hermes, Lethe creola,* and *L. portlandia* exhibited good flights. In June, the flights were fairly normal. However, *Euptychia gemma, Strymon edwardsii, S. titus,* various species of *Catocala, Antheræa polyphemus, Actias luna,* and *Automeris io* were more abundant. *Colias eurytheme* and *Speyeria cybele* were comparatively rare. The July flights were relatively normal. At Banner's Elk in Avery County, *Speyeria cybele, S. aphrodite, Boloria toddi, Colias eurytheme,* and *C. philodice* were common. *Cercyonis alope* was less abundant. *Polygonia progne* was collected at Banner's Elk, and another on Roan Mt., Tennessee.

CHARLES COVELL collected at Wilmington, North Carolina, on March 31 and found the following species on wing: *Papilio marcellus; Anthocaris genutia; Papilio troilus; Polygonia interrogationis; Eurema nicippe;* and *Amblyscirtes carolina.*

SOUTH CAROLINA

JOSEPH PRESKAR recorded the following species from Spartanburg, South Carolina, on July 9 and 10: *Automeris io; Catocala grynea; Urbanus proteus.*

FLORIDA

W. M. DAVIDSON, collecting around Orlando, Florida, noted that the year did not show any abnormal occurrences in Lepidoptera. However, flights of *Atrytone arogos* and *Atrytonopsis loammi* were smaller than those of the

previous year. *Atlides halesus* and *Strymon m-album* were also comparatively rare. *Strymon favonius, Phoebis philea,* and *Danaus gilippus berenice* had increased flights.

R. L. and O. D. CHERMOCK, collecting in the Ocala Island region of Central Florida in the end of August, found practically no butterflies on wing because of the long extended dry period in that region. A few specimens of *Lethe portlandia* were found in the more humid palmetto hammocks, and an occasional *Eurema nicippe* and *Hylephila phyleus* were the most abundant butterflies in the myrtle-scrub oak associations. In the vicinity of Ormund Beach, butterflies were scarce, although *Lephelisca virginiensis* and *Brephidium pseudofea* were relatively abundant.

S. S. NICOLAY collected at Pensacola, Florida, on April 3 and obtained a fair series of *Thorybes confusis* and *Hesperia attalus.* However, his favorite collecting spot for *Atrytone berryi* and *A. dion alabamæ* has been destroyed.

ALABAMA

In central Alabama, the winter of 1951 to 1952 was mild and comparatively warm with no snow. The early part of 1952 was characterized by normal rainfall and a relatively early spring. Apparently, these factors encouraged an excellent spring flight of butterflies. During April, all of the commoner species had exceedingly good flights. At wet patches along the dirt roads, *Papilio philenor, P. marcellus, P. troilus, P. glaucus, Eurema nicippe, Phyciodes tharos, Everes comyntas, Erynnis juvenalis, E. brizo,* and *E. martialis* would rise in clouds when disturbed. Many of these same species were common in the woods along with *Anthocaris genutia, Achalarus lyciades, Euptychia gemma,* and *E. hermes.* During the end of April and early May, many of the rarer or more local species for this region flew in increased numbers, some of them being relatively abundant. Among these were *Megathymus yuccæ, Polites manataaqua, Hesperia metea, Amblyscirtes vialis, Melitæa gorgone, Euphydryas phaeton, Incisalia niphon, I. henrici, Strymon titus, S. falacer* and *S. liparops.* From the middle of May through most of September, this region experienced the worst drought in almost 50 years. The farmers' crops withered to the ground, and most of the herbaceous plants barely struggled to survive. The summer flights of butterflies were seriously depleted, and even the commonest species were relatively rare, with the rarer species being practically non-existent. A few small rains occurred in the fall, but this was again followed by a more or less continuous drought, with many of the forested areas being damaged by extensive forest fires. As a result, the fall flight was relatively poor in comparison to previous years. There was almost no evidence of any butterfly migration during this period.

ARKANSAS

H. A. FREEMAN collected in Faulkner Co., Arkansas, from June 17 to July 8. Many of the flowers, such as *Asclepias tuberosa* and *Cephalanthus occidentalis,* which normally attract numerous butterflies, were in poor bloom because of "one of the worst dry spells in history". The butterflies were also affected by the extremely dry summer. *Strymon liparops, S. ontario, Amblyscirtes belli, A. linda, Thorybes confusis, Polites verna, Euptychia gemma*

and *Lethe portlandia* did not make their appearance. *Speyeria diana* and *S. cybele* were very rare. The following species appeared in fair numbers: *Epargyreus clarus, Achalarus lyciades, Thorybes bathyllus, T. pylades, Polites themistocles, Polites manataaqua, Atalopedes campestris, Lerodea l'herminieri, Amblyscirtes vialis, Pholisora catullus, P. hayhurstii, Papilio polyxenes, P. cresphontes, P. troilus, P. philenor, P. glaucus, Phyciodes tharos, Junonia cœnia, Vanessa antiopa, V. atalanta, Nathalis iole, Colias eurytheme, Eurema nicippe* and *E. lisa.* Among the moths, *Xylophanes tersa* and *Herse cingulata* were below average as to normal occurrence, while *Phlegethontius sextus* and *P. quinquemaculatus* exhibited normal flights.

EDWARD C. WELLING and J. PRESKAR collected in Texarkana and Forest City, Arkansas, from June 27 to July 4, and recorded the following species: *Euptychia cymela; Adelocephala bicolor; Celerio lineata; Actias luna; Catocala dejecta; C. subviridis;* and *Smerinthus jamaicensis.*

No observations on migrations were made for the year 1952 in this area, and the observations on moths were too sparse to allow any significant conclusions.

Contributors: ROBERT BUTLER; R. L. CHERMOCK; C. V. COVELL, JR.; W. M. DAVIDSON; H. A. FREEMAN; J. R. MERRITT; S. S. NICOLAY; JOSEPH PRESKAR; P. S. REMINGTON; E. C. WELLING.

Dept. of Biology, University of Alabama, University, Ala., U. S. A.

7. NORTHEAST — DELAWARE AND PENNSYLVANIA NORTH TO SOUTHERN QUEBEC

by SIDNEY A. HESSEL

The following brief summary was compiled, as in the previous report, from official United States and Canadian weather bureau sources. It treats in generalities over extensive areas. Local experience, at times, would seem to depart somewhat as reported by contributors.

Spring temperatures (March - May 1952) were well above normal, averaging plus 2° for the entire area. Rainfall was about normal in Northern Maine, Southern Quebec and the Maritime Provinces, increasing southward to about double normal in central Pennsylvania (Harrisburg).

Summer temperatures (June - August) continued above normal generally, ranging from plus 2° through Pennsylvania and Delaware to plus 3° or more over New York, New England, Quebec and the Maritime Provinces, with greatest departure towards Quebec City where the average was nearly 4° higher. July in New York City was the warmest calendar month in the history of the weather bureau. Similar records were made or neared at most northeast United States points. Rainfall was above normal along the coast from Delaware to

Nova Scotia, about normal in the interior of New England, New York and Southern Quebec and perhaps slightly below in central and south central Pennsylvania.

Fall temperatures (September - November) maintained the above normal levels of the earlier seasons, being plus 1° – 3° over the entire area except Pennsylvania, where near normal to 1° below normal prevailed. The coastal regions of Canada were about 1° above normal but the area around Quebec was from 1°—3° below. Rainfall in Delaware, New Jersey and Southeastern Pennsylvania averaged normal to 25% higher, the greater departure towards the south. The balance of the area was about 75% of normal, with the lowest, about 50% around Boston.

Contributions of widely varying length and coverage from approximately twenty sources indicates that the collecting season was poor to normal for diurnals but rather improved over 1951 with respect to most families of moths.

Although mass migrations were not quite as much in evidence for the Monarch as in 1951, almost all other migratory species appeared in greater than normal numbers. Most notable was *Vanessa cardui,* scarce since 1949. LATHAM estimates Long Island numbers equal to 1934, the maximum of very many years of observation, for the season 156 were at light! REMINGTON notes Connecticut numbers in excess of 1949. *Phœbis sennæ* was in much greater evidence in its northern range than for many years. ROZMAN, observing at Chesapeake Beach, Md., found it common at the end of August although unrecorded the year before and uncommon in 1950 at the same point. LATHAM at Orient, Long Island, found it for the first time since 1934, five individuals, all flying west and visiting flowers, were noted between August 29 and October 8. *Euptoieta claudia* was also outstanding for increased numbers.

Of the Sphingidæ, most noteworthy were *Herse cingulata* and *Celerio lineata* in increased numbers, a capture of the first mentioned April 14 on Long Island being particularly early. *Xylophanes tersa* and *Amyna octo* were recorded by KIMBALL on Cape Cod. Detailed summary by regions follows.

MARYLAND

Chesapeake Beach, Maryland, July 27 - August 24, 1952 (ROZMAN): About 39 species of butterflies and skippers are recorded, with *Papilio marcellus, Colias eurytheme, Everes comyntas, Strymon melinus, Pholisora catullus,* and *Vanessa virginiensis* noted in reduced numbers. *Mitoura gryneus, Libytheana bachmanii,* and *Strymon cecrops* were absent. Only *Phœbis sennæ* of the butterflies was noted in greater than usual numbers. *Ampelœca myron, Dolba hylæus,* and most particularly *Celerio lineata* of the moths were in greater evidence. A recently instituted program of DDT spraying of roadsides is suggested as having a particular bearing on the *C. eurytheme* population.

PENNSYLVANIA

Lancaster County (EHLE): Observation of five new species of butterflies brings the total to 91 over a thirteen-year period. These were *Lethe portlandia, Incisalis irus, I. niphon, Erynnis martialis,* and *Lerema accius.* Emergence dates are reported as normal for most species, slightly later than

1951; numbers, on the whole, average. The oft-heard lament of loss of favorite collecting areas along railroad and power lines by virtue of chemical sprays is voiced. Considered of more than routine interest are the following observations. Fresh individuals in fair numbers in early July suggest a second brood of *Euptychia cymela. Euphydryas phaeton*: when the host plant, *Chelone glabra,* became exhausted in late May, mature larvæ devoured blossoms of *Valerianella radiata* (Beaked Corn Salad). *Polygonia interrogationis*: many fresh, dark specimens near end of May (first brood?); these appeared again towards the end of June and continued to emerge to the end of August; in the latter month all stages from egg to worn ovipositing females were in evidence; adults were far less plentiful than larvæ; over half of reared pupæ were parasitized. *Polygonia comma*: early dark form, commoner than usual, on wing throughout July and August; light form first observed August 24. *Papilio marcellus* in better numbers, with nice definition of broods; major flights of spring forms observed mid-April and mid-May; a large brood at the end of June was observed through all early stages in the field and in captivity. *Papilio philenor*: fresh individuals in September (partial third brood?). *Colias eurytheme* and *C. philodice* spring broods scarce, abundant in September and October. A tabular comparison with 1951 of the frequency of all species ever recorded is given.

On May 1 at Chiques Rock, 11 specimens of *Anthocaris genutia* were captured and 8 more near Conestoga Creek. On May 4 the former locality yielded 6 more *A. genutia* and three males and one female *Papilio marcellus,* which species had not been seen three days earlier (PRESTONS).

Irwin Area (ACKERMANN): The weather was cold and rainy to mid-April. By April 20 the usual spring flora was in bloom but only *Nymphalis antiopa* was seen on the wing. May continued wet with very few butterflies in evidence. At the end of the month large numbers of larvæ of *Asterocampa clyton* (2nd and 3rd instars) were observed on the lower branches of the Hackberry trees. Of some 40 specimens reared almost two-thirds were females. Not a single female was observed free at the same locality at the time of emergence of the brood.

Sullivan County (ACKERMANN): In the northeastern corner of the state several *Limenitis arthemis x astyanax* were taken August 19.

Centre County (PRESTONS) Spring collecting began about the third week in April after an unusually wet and snowless winter. April was a very wet and dreary month with temperatures slightly higher than normal, and with few clear days. The usually abundant *Lycænopsis pseudargiolus* was noticeable in its absence from haunts of the previous year. However, *Erynnis* were plentiful with *E. brizo* and *E. juvenalis* being even more plentiful than in 1951, and *E. icelus* becoming common about the beginning of the second week of May. At the same time *Phyciodes tharos, Polygonia comma,* and *Boloria toddi* made their appearance. On May 10 at Bear Meadows (elevation 2000 ft.) *Erynnis* were plentiful as were *L. pseudargiolus.* A single *Incisalia augustinus* was captured. A week later the *Erynnis* were on the decline, and *Phyciodes tharos* was plentiful. A few *Papilio glaucus* and *P. troilus* appeared. By the middle of June the collecting around State College was bringing in *Papilio glaucus,* (yellow form), *Euptychia cymela, Thorybes pylades, Poanes*

hobomok, Ancyloxypha numitor, and *Phyciodes tharos.* At Bear Meadows, *P. troilus* was very abundant as was *Limenitis astyanax.* A single *L. astyanax x arthemis* was taken. *Melitæa harrisii* was common. *Hesperia sassacus* and *Euptychia cymela* were also in evidence. By mid-August *Colias philodice, P. tharos* and *B. toddi* were numerous and fresh. Other species taken were *Cercyonis alope, A. numitor, Speyeria cybele* and *S. idalia, Hesperia leonardus, Everes comyntas,* and *Polites themistocles.* By the last week of August, possibly because of drought, collecting was very poor.

NEW YORK

Ithaca (KEJI): A careful and detailed chronicle of Monarch observations is presented, the first recorded being July 6, and the last October 13. Until August 3 only singles appeared and no evidence of concentration until September 13. On the 23rd of the month 127 were counted from 5:20 P. M. to 6:30 P. M. The extensive list notwithstanding, KEJI writes in part, "Monarch season rather poor around here. Probably because food plant of larvae getting scarce close by, due to repeated cutting and clearing of ground. Last such migration witnessed in 1949 . . . a few hundred yards eastward." The capture of some new species and increase in the numbers of others is attributed to the use of six instead of two traps in the woods. Fifty-two species of butterflies and skippers are listed with data on first and last days as well as comment on frequency and time of appearance. A selection of key species is presented herewith. "E" represents earlier, "L" - later and "S" - same with regard to first and last observation dates. The numerals measure such margins in days compared to 1951. "I" - increased, "D" - decreased and "N" - no significant change, compares the number of individuals to 1951. *Euptychia cymela* May 30 - July 7 (36 days: 5L, 4L, 100% I): *Cercyonis alope* July 6 to August 7 (29 days: 2E, 6E, 100% I): *Speyeria cybele* June 24 - September 5 (18 days: S, IL, slight I): *Boloria toddi* May 9 to September 6 (14 days: 18E, 13E, slight I): *Polygonia interrogationis* May 31 to October 12 (79 days: 25E, 19L, great I): *Nymphalis antiopa* April 17 to October 13 (60 days: 13L, 2L, I): *Vanessa cardui* June 7 to October 9 (28 days: absent 1951): *Lycæna phlæas* June 1 to October 22 (71 days: 17E, 4E, large I): *Everes comyntas* June 17 to September 28 (20 days: 15E, 3E, D): *Lycænopsis pseudargiolus* April 18 to August 14 (21 days: 30E, 4L, I): *Papilio glaucus* May 19 to August 7 (47 days: 2E, 7E, I): *Colias eurytheme* June 13 to October 22 (25 days: 3E, 4E, considerable D): *C. philodice* May 22 to November 2 (98 days: 7L, 7L, D): *Pieris rapæ* April 26 to November 14 (156 days: 4E, 19L, large D): *Poanes hobomok* May 24 to July 6 (38 days: 2L, 13L, large I).

Rockland County (SHULGIN): Collecting was for the period June 20 to the end of the year. About 20 diurnals and 47 moths comprise the list of captures. As this was the first year of collecting in the locality, comparisons are unavailable. Dates for the *Catocala* were: *C. amatrix* September 1; *C. concumbens* July 31; *C. cara* August 18, September 23; *C. ultronia* August 25; and *C. vidua* September 14.

Eastern Suffolk County (LATHAM): The majority of species were more common than in 1951 and it was a better collecting season except late in the fall. Most notable increase was *Vanessa cardui* which jumped from near zero

the past two seasons to the maximum of abundance of 1934. First one June 9, they were common by July 1 on flowers of California Privet, when 300 to 400 could be noted in a few hours. They continued common until October. 156 were recorded at light during the season, 7 the most in one evening. On the other hand *V. virginiensis* was more scarce than in 1951. *Danaus plexippus* was slightly less common than in 1951, but the fall migration was near the same in numbers, though more erratic. *Phœbis sennæ* was recorded for the first time since 1934 on the north fork of the Island, five singles between August 29 and October 8, all flying west and visiting flowers. *Papilio ajax, P. glaucus,* and *P. troilus* showed increase at normal dates. *Nymphalis antiopa* most frequent since 1945. *Limenitis archippus* increased. *Erynnis brizo, E. juvenalis,* and *E. horatius* were common April 20. *Incisalia augustinus* was common April 16 and one *I. niphon* was taken on April 21. All other butterflies were normal, with 1951 dates and numbers, except *Lycæna epixanthe,* which on June 28 fairly flooded one cranberry marsh. It was a day of damp, chilly east wind following three days of heat-wave and high humidity; the whole marsh was covered with them hovering over or resting on the low vegetation. None were seen in extended flight. Up to 8 were taken in one sweep of the net. The numbers were estimated at 6 per square foot over several acres.

Weather for the season: Temperature near normal or above, with very light snow and no extreme cold through winter of 1951-52. A warm spell with temperature in the 80's started April 19, and for several days brought to light a few *Scoliopterx libatrix, Baileya dormitans, Xystopeplus rufago* and increased numbers over other years of *Orthosia hibisci, Crocigrapha normani,* and *Melanolophia canadaria.* Weather through May and early June was normal, with extremely hot, humid weather the last half of June. The first good light-collecting nights began June 23. July was droughty with normal temperatures. There were heavy rains in August. The fall was dry, with cool to cold weather with poor collecting late in the fall.

Celerio lineata showed marked increase over 1951. *P. sextus* was more common than in years. Other Sphingidæ same as 1951. *Hyalophora cecropia, Antheræa polyphemus, Anisota rubicunda, Eacles imperialis* and *Citheronia regalis* showed increase and *Hyalophora promethea, Actias luna, Automeris io* and *Anisota stigma* appeared in reduced numbers. Arctiinæ were generally more scarce than in 1951. Most of the Cutworm groups showed an increase over 1951. 6 *Loxagrotis acclivis* and one *Protoleucania rubripennis* were again taken. *Pseudaletia unipuncta* was abundant in all three generations; first April 5 and very large flights May 11 and 21, and in the fall to November 25, young larvae were abundant on lawns late May. *Rusina bicolorago* was greatly reduced from last year, while *Alabama argillacea* and *Anticarsia gemmatilis* showed increase. The last was common September 14 to October 16, first September 2. First *A. argillacea* August 31. *Leuconycta diptheroides* decreased and only one *Amphipyra pyramidoides* was seen. *Schinia bifascia* continued same as usual with its very short season. *Catocala* were again scarce and few specimens found. *Doryodes* was notably increased: May 11 to November 3. A large larval colony of *Archanara densa* was found in Pickerel-weed. *Malacosoma americana* was again scarce on the east end of the fork but showed increase westward. Most of the Geometridæ were normal in

time and abundance. Of the micros, Nymphulinæ, Schoenobiinæ, Crambinæ and Phycitinæ showed increases over 1951, and Tortricidæ showed decrease. Of 300 Pitcher-plants examined, only one plant contained larvæ of *Exyra rolandiana* and none any evidence of *Papaipema.*

Nassau County (W. Shockley) A letter from Wilfred Shockley, United States Department of Agriculture, reports the capture of *Platyedra vitella* (gelechiid) infesting Hollyhocks at Mineola, Long Island. The insect, native to Iran, is primarily a pest of Hollyhocks but occasionally damages cotton, It is therefore requested that should the moth be observed, or damage to the seeds of Hollyhocks by a lepidopterous larva be discovered that he be advised: P. O. Box 72, Greenfield, Mass.

NEW JERSEY

The reports for this state are sadly deficient, the substantial number of good collectors residing there notwithstanding. Most of these were actively engaged in collecting at distant parts. The few fragments available follow. At Freehold, April 20 several *Anthocaris genutia* and *Nymphalis antiopa* (worn) and singles of *Incisalia augustinus* and *Psychomorpha epimenis* were captured (Shulgin). Fred Naumann advises "All of us here agree that so far as day-flyers are concerned, 1952 was the poorest season ever." He noted that moths were about normal and reported the capture of a *Sphinx frankii* by Buchholz. Two trips to Lakehurst by the author timed to proper season as evidenced by the flora, and with weather favorable, produced a single male *Mitoura hesseli.* I believe not more than one or two others were taken in spite of special trips.

CONNECTICUT

New Haven Area (Remington): "For the fourth consecutive year of observations here, the winter was mild. The spring was one of the rainiest and cloudiest in recent years. April was generally dark and wet. In May the rainfall totalled 5.45 inches (1873-1936 average is 3.70 in.) In May there was 55% of possible sunshine (average 61%), with 9 days clear, 9 partly cloudy, 13 cloudy (average 11, 10, 10). June opened with 2 inches of rain June 1, and a total of 3.17 inches during the 3 day week-end May 30 - June 1 (total average rainfall for all of June is 3.19 inches). Complete weather data are not yet available. Aside from the heavy spring precipitation the principal weather abnormality was an exceptionally hot and dry period in July.

"Field records were made at least once each week (usually oftener) from March 26 through December 6. For example *Papilio glaucus* was recorded on 15 different days from April 30 through July 1.

"Spring flight dates for key butterflies, with 1950 and 1951 comparisons, follow (number of different days recorded in parentheses):

Species	1952	1951	1950
L. pseudargiolus	11 April - 25 May (12)	13 April - 17 May	19 April - 14 May
E. brizo	30 April - 24 May (5)	21 April - 13 May	6 May - 13 May
E. juvenalis	20 April - 10 June (9)	28 April - 31 May	13 May - 4 June
A. genutia	20 April - 27 May (4)	28 April - 9 May	3 May - 13 May
S. melinus	30 April - 24 May (5)	6 May -	6 May -
L. hypophleas	19 May - 17 June (5)	15 May - 26 May	27 May - 23 June

It is difficult to find satisfactory evidence of a difference between 1952 and 1951 in the start of the season. But quite consistently the flight-periods continued longer in 1952 than in 1951. The data indicate that all spring flight-periods in 1949 were earlier than in the succeeding three years. Some highlights of the spring Lepidoptera were: more *Incisalia augustinus* (30 April - 19 May) and *Hesperia metea* (10-24 May) were found than in 3 earlier years; *Nymphalis antiopa,* none fresh, was abundant 26 March to 19 May (seen 13 days), the first fresh adults appearing May 24; *Mitoura gryneus* was very rare for the third successive spring; *Anthocaris genutia* was probably commoner than in 1950 or 1951; it was a spring of abundance as usual for *Erynnis juvenalis, Lycænopsis pseudargiolus, Strymon melinus; Everes comyntas, Phyciodes tharos, Boloria toddi, Papilio glaucus, P. polyxenes, P. troilus, Achalarus lyciades, Hesperia sassacus, Poanes hobomok, and Euptychia euryta. Alypia octomaculata* was abundant April 26 into June. *Malacosoma* larvae were unusually numerous on *Prunus,* few *P. serotina* escaping early defoliation; *Isturgia truncataria* was abundant May 9 and 19; a fresh, fertile ♀ *Prionoxystus macmurtrei* was taken June 2.

"This was a year of greater immigration than the three preceding years. The most prominent species was *Vanessa cardui,* but there were others taken either as immigrants or southern intruders precariously established. The first *Asterocampa clyton* in 4 years was found July 14. *Euptoieta claudia* was found in New Haven (1) June 8, and at Bakersville on August 14, 4 ♂♂ and 1 ♀ in fair condition were taken and another seen. On August 21 in New Haven, 2 fair ♂♂ of *Strymon m-album* were taken a few yards apart. Two fresh *Papilio philenor* were found June 2. A fresh ♂ *Hylephila phylæus* was taken September 28. A *Herse cingulata* ♂ was found in a light trap at Windsor by J. B. KRING. *Danaus plexippus* was seen very early, May 14 and 18, one fresh on June 11, the usual numbers July 1 - September 28, and one fresh as late as October 20, but no conspicuous mass flights were noticed or rumored.

"The immigration of *V. cardui* was apparently even larger than in 1949. Not one specimen was seen in 1950 and 1951. The first record is from New Haven, where five "flown" specimens were taken June 10. A fair ♂ was found at Sharon July 3 and 2 worn and 1 fresh ♂♂ July 14 on West Rock (8 P.M.!). Fresh specimens were found around New Haven on July 18, 26, 28, 30 and August 1, 11, 12, 17, 18, 19, 20, 21, 22, 30. Hundreds were found in an alfalfa field near Amenia Union, July 26, looking fresh but often torn. Fair numbers were found August 14, at Litchfield, Bantam, Harwinton, and Bakersville. Worn specimens were flying at New Haven on September 2, 4, 5. *V. cardui* was fresher and more numerous September 5 at Branford, Madison, and Guilford. One fresh adult was taken on *Aster* in Woodbridge September 28. Essentially all *V. cardui* seen this year were on flowers, so little evidence on rate and direction of movement could be gotten. On August 18, in New Haven, 3 were seen from noon to 2:30 P.M. flying strongly westward 3' to 5' above the ground, but on August 20, 2 were seen at 9:45 A.M. flying strongly eastward, also near the ground. Thistles around New Haven were searched all summer, but no larvæ or nests were found there. However, several recently vacated nests on thistle were found at Salisbury on July 26, and 4 larvæ were taken on thistle at West Hartland on August 14. None of

the infestation of Hollyhocks so typical in Missouri during immigration was noted this year in Connecticut, although some damage to an herb garden was reported.

"Most summer species seemed to have an average year. Some representative flight-periods were as follows:

Cercyonis alope	July 6 - Sept. 5 (11 days)
Euptychia euryta	May 27 - July 26 (15 days)
Lethe eurydice	June 25 - July 26 (5 days)
Euphydryas phæton	June 17 - July 1 (4 days)
Boloria selene	June 17 - July 12 (4 days)
Papilio troilus	May 24 - July 14 (9): Aug. 15 - Sept. 5 (3)
Strymon titus	July 12 - 26 (4 days)
S. falacer	June 24 - July 19 (4 days)
S. edwardsii	June 24 - July 14 (3 days)
S. acadica	July 1 - 26 (8 days)
S. melinus	July 12 - 14 (2 days): Aug. 12 - Sept. 5 (5)
Pholisora catullus	June 14 - 15 (2 days); July 11 - 19 (4);
Ancyloxipha numitor	Aug. 20-22 (2)
Polites verna	June 7 - July 14 (10); July 26 - Sept. 28 (10)
Atrytone conspicua	July 1 - 26 (5 days)
	July 12 - 26 (3 days)

"Flying from early July to mid-September with no definite gaps were *Everes comyntas, Lycæna hypophleas, Phyciodes tharos, Eurema lisa, Papilio glaucus.* This was the heaviest year in four for *N. antiopa,* with a succession of broods and some defoliation (mainly of *Celtis)* by larvæ. *Erynnis baptisiæ* larvæ were numerous, but this may not be unusual. It was the poorest year in four for *Asterocampa celtis. Ctenucha virginica* was unusually common in late June and early July. *Cisseps fulvicollis* was extremely abundant all summer. Larvæ, but not adults, of *Feniseca tarquinius* were found, but the great numbers of 1950 were not approached. *Datana integerrima* defoliated many *Juglans,* but less than in 1951. *Cingilia catenaria* had almost disappeared, following the tremendous numbers of 1951. Several *Hesperia leonardus* were taken September 5.

"Regular records were kept of common moths at light in North Haven after the middle of June. Present in great numbers were:

Itame pustularia	June 23 - end of July
Eugonobapta nivosaria	June 23 - July 20
Nematocampa filamentaria	June 23 - July 13
Euchlæna serrata	June 30 - July 13
Lagoa crispata	June 30 - July 6
Limacodes biguttata	June 22 - July 15
Erannis tiliaria	October 16 - November 18
Alsophila pometaria	November 16 - December 6

Also in pest numbers were *Pseudaletia unipuncta; Malacosoma americana; Halisidota tesselaris; Isia isabella.*"

Washington (C. L. Remington, S. A. Hessel): Some notable moth records June 25 were: *Calledapteryx dryopterata* ♂ and ♀; *Pheosia rimosa* ♀; *Apantesis virguncula* ♀; *Zeuzera pyrina* (num.); *Oreta rosea* (num.).

Having moved from Long Island to this locality in late July with the attending demand on my daylight hours, almost no diurnal collecting was afforded. Using a "CX" 250 watt bulb together with a 15 watt BL fluorescent tube at the house over 220 species of moths, exclusive of micros, were taken from July 23 to the end of the season. Of these about 35 were hitherto unrecorded in the Connecticut list. The actual number of individuals was, however, surprisingly small. Almost all new records were singles or pairs, as were half or more of the general list. Only *Erannis tiliaria* and *Cingilia catenaria* appeared in numbers over fifty in a single evening, about 150 in these cases. Comparisons with other years cannot be made, but the most impressive group were the *Papaipema,* including *maritima, impecuniosa, nebris* and f. "nitela", *cerina, inquæsita* and f. "wyatti", *furcata, arctivorens, astuta, rigida, humuli, sciata, cerussata, baptisiæ, cataphracta, pterisii,* and *lysimachiæ.* Also well represented was *Graptolitha* with the following at hand: *laticinerea, unimoda, bethunei, baileyi, querquera, antennata, fagina,* and *petulca.*

Greenwich (KLOTS): Spring brood *L. pseudargiolus* as usual, April 16 - May 16; *Pieris virginiensis,* as usual, May 2 - 9; *Erynnis icelus* and *E. juvenalis* May 2 - 16; one very worn *Vanessa cardui* (hibernator?) May 16; one worn *V. atalanta* (hibernator?) May 9.

MASSACHUSETTS

Barnstable (C. P. KIMBALL): The spring was normal through June. During July no rain fell and the temperatures were well above average. August was very rainy and from then on the weather was more or less normal.

"Up to the first of August collecting was somewhat better than in recent years as far as numbers of specimens, the nightly catch of moths several times going over 2000, but the number of species was distinctly less. After August 1st, with the advent of the continuously wet weather, collecting became poor in all respects.

"Certain species were present in above average numbers: *Limenitis astyanax, Hyalophora cecropia, Automeris io, Phlegethontius sextus, Sphinx drupiferarum, Paonias myops, Darapsa pholus, Halisidota tessellaris, Catocala similis, Mocis texana,* many notodontids (especially the females, which was also true to a lesser extent with the Sphingids). *Lambdina pellucidaria* was in excessive abundance; also found were *Metasiopsis ossularia, Nomophila noctuella* (abundant), *Mineola vaccinii, Dioryctria auranticella, Zonaria interruptolineana, Argyrotænia velutinana* and *A. pinatubana,* both abundant.

"In general, Noctuids were scarce, particularly *Feltia* ssp. Also noticeably scarce were *Crambus* spp. Pieridæ were seen on only a few occasions, not more than two or three examples of each of the three common species being observed.

"Strays were infrequent. Only one specimen of *Anticarsia gemmatilis* was seen. Two unusual species turned up, *Xylophanes tersa* and *Amyna octo.* One specimen of *Smerinthus jamaicensis* f. norm. "geminatus" looked more like the southern than the northern form, and may have been a stray. Two other sphingids were present, *Herse cingulata* and *Celerio lineata,* but there

is some question in my mind as to whether they may not have become established in this relatively mild climate, and this is said in spite of the rather severe preceding winter. *C. lineata* is regularly taken in fair numbers during both June and September, and in fresh condition invariably. *H. cingulata* has been taken on three occasions with June and October dates, also in fresh condition, and it has come to my attention that a sweet potato patch has been under cultivation about 10 miles from my house for some years.

"Perhaps the most outstanding feature of the season was the appearance of many Notodontid and Sphingid females, particularly the former. I took females of practically every Notodontid which is recorded for Barnstable, many of which I had never before taken in some 17 years of collecting, in any locality."

General (Mrs. COTTRELL): Monarch observations and marking notes involving Massachusetts, New York, and New Hampshire localities are submitted. No mass movements were in evidence and no marked specimens are mentioned as recovered. Earliest date recorded was July 14, latest date October 9.

VERMONT

Vic. Mt. Equinox (KLOTS, HESSEL, C. L. REMINGTON): May 23-24 *Pieris napi* was common as usual, with *Boloria toddi.* Season 10 days early. (KLOTS).

On June 6 *Amblyscirtes vialis* males numerous and fresh. Also fresh and in fair numbers were *Boloria toddi, Hesperia sassacus, Poanes hobomok, Papilio glaucus, Lycæna hypophleas.* Rather worn male *P. napi* were taken. A few *Ematurga amitaria* (day flying geometer) were at hand.

NEW HAMPSHIRE

White Mountains (LENNOX): "The collecting was poor, generally speaking. The weather was very dry up here, the worst drought in years. *Pieris napi* was plentiful in May but Speyerias noticeably scarce as the summer progressed. Colonies of *Nymphalis milberti* were found and reared to maturity, being practically free of parasitism. Reared *Œneis jutta* came through in fine style, producing full sized specimens. A trip was made to the high lands of the mountains for *Œneis semidea* in July. They were normally common. Another interesting catch that day was my first *Apantesis quenseli,* Moth collecting was productive in my local bog, where I took a good series of *Parasemia parthenos.* Collecting also proved to be exciting near tree-line in Jefferson Notch, where with DOUGLAS FERGUSON we took a good series of *Anomogyna sincera.*"

MAINE

Vic. Lincoln (GREY): Spring, as in 1951, was very wet but by midsummer a drought of serious proportions was at hand. The most serious threat is the long-range one that the water table is dropping rapidly. It was dramatically demonstrated this summer when the bogs, wetter than in many

years, dried out by mid-summer, showing that the surface moisture has nothing much underneath to maintain it. A new locality where *Incisalia lanoraieensis* can be collected "dry shod" is reported. Although Incisalias were reported in good quantity, "the year had the dubious distinction of being the poorest season in the east for *Speyeria* ever known within the memory of living collectors". The most unusually abundant diurnal was the skipper *Poanes hobomok.*

Augusta (A. E. Brower): The snow went off early, but then most of May and June was cold and cloudy and very few butterflies were to be seen. This was followed by very dry weather until the latter part of August when showers came; however few butterflies were to be seen.

Papilio polyxenes was the first seen at Augusta on May 17, while *P. glaucus* was first seen on the preceding day and again on May 24 and at Upton on May 30. May 16 was the date for the first two *Colias philodice* seen at Augusta. On May 9 the first *Pieris rapæ* were seen at Augusta and several the next day; one or two each for Richmond and Brunswick on May 10; at Upton on May 30 and Wilson Mills on May 31. *Pieris napi* was seen at Upton on May 30. *Danaus plexippus* was observed at Norridgewock July 13. *Speyeria cybele* was seen in Augusta on July 11. *Polygonia faunus* was seen at Upton on May 30, and at Wilson Mills on May 31. The first fresh *P. faunus* and *P. progne* of the 1952 season were seen at Augusta on July 15, these were both males. The first of the new brood of *Nymphalis j-album* were seen at Belgrade July 11 and at Augusta July 15; the species was taken on Mt. Bigelow on August 2 and 3. *N. milberti* was taken on Mt. Bigelow August 2 and 3. At Augusta on March 22 a *N. antiopa* was seen flying close at hand and watched. The sun was warm, but there was deep snow on the ground. Three specimens were seen at Bar Harbor on May 20. The first of the new brood were seen at Belgrade on July 12. The first *Vanessa atalanta* was seen at Upton May 30 and at Wilson Mills May 31. *Vanessa cardui* or *V. virginiensis* was seen flying at Bar Harbor May 20. On Mt. Bigelow on August 2 and 3, *V. virginiensis* was present in fair numbers, and *V. cardui* was abundant. The first *Limenitis archippus* was seen at Augusta on June 13, and both male and female at Jefferson on June 15. Dates for *Strymon acadica* are Jefferson July 4, Augusta July 11, Belgrade July 12 (a female on Cone Flower). *S. falacer* was seen at Belgrade on July 11, *S. liparops* at Augusta July 26. At Bar Harbor on May 20 the first two or three *Incisalia augustinus* were seen and one was caught; at Grafton Notch it was flying in numbers on May 30 and in small numbers at Wilson Mills on May 31. *Lycænopsis pseudargiolus* was seen at Dryden the last days of April; at Brunswick on May 10; at Bar Harbor May 20, three specimens; at Grafton Notch on May 30 and Wilson Mills May 31. Dates for *Erynnis icelus* are Grafton May 30 and Wilson Mills May 31. The first record of *Erynnis juvenalis* for Mt. Desert Island was made with both male and female taken at Bar Harbor on May 20. *Ancyloxypha numitor* was first seen at Augusta on June 23, another on June 27, and it was common at Berwick in August. The first *Hesperia sassacus* of the season was seen at Augusta on June 7. *Polites themistocles* was first seen at North Belgrade on June 22; *P. peckius* at Benton June 28. *Poanes hobomok* was first seen at Augusta on June 5 and Oakland June 6. At Benton the first *Amblyscirtes vialis* was seen on June 6. *Hemaris diffinis*

was seen at Upton on May 30 and 8 specimens of *H. thysbe* at Benton on June 6. Data on *Amphion nessus* are: Augusta June 5, Benton June 6, Augusta June 16 feeding at Rocket plant 6.50 P.M. in a sunny spot. *Lycomorpha pholus* was seen at Blue Hill on September 2. A number of *Ctenucha virginica* were seen at Belgrade on July 11. *Clemensia albata* was taken at Ashland on July 27. Several *Cycnia tenera* were taken at Jefferson July 4 and 5. *Anarta cordigera* was seen at Grafton May 30 and Wilson Mills May 31. *Graptolitha fagina* was taken at Augusta September 26. The first *Septis finitima* was seen at Augusta June 16, and again seen June 20. *Hyppa xylinoides* was taken at Gardiner June 7. Sidney Bog outside Augusta, the first 5 *Lithacodia bellicula* were seen; at Augusta July 15 *L. muscosula* was taken; at Benton June 28 *L. synnochitis* was first seen. *Capis curvata* was captured in a bog at Alfred August 9. Three *Autographa vaccinii* were taken at golden rod flowers on Mt. Bigelow 4150 ft. elevation August 2. Data on *Catocala* as follows:

C. antinympha at light at Otter Creek Camp Ground, Bar Harbor 3 A.M. on August 17; *C. meskei* was taken at Wilton July 14, the first Maine record; *C. concumbens,* at light on side of house at East Orland August 17; *C. sordida* at light Dennysville July 25; *C. præclara* at light Otter Creek Camp Ground, Bar Harbor August 16. The first *Euclidina cuspidea* was taken at Jefferson on June 14. *Cænurgina crassiuscula* was taken at Upton May 30, at Wilson Mills on May 31. The first *Zale aeruginos* was taken at Augusta June 7. *Epizeuxis rotundalis* was taken Augusta July 15. The first *Nerice bidentata* of the season was taken at Augusta June 21. At Augusta the first *Porthetria dispar* was seen July 3 and several July 6. May 16 at Belgrade the first *Mesothea incertata* was seen. *Dysstroma truncata* was taken on Mt. Katahdin August 24. *Xanthorhoe emendata* was taken at Lincoln July 23; *X. ferrugata* was first seen on May 28 at Augusta. *Entephria aurata* was taken sitting on a golden rod head on Mt. Bigelow August 2. The first *Euphyia intermediata* was taken at Augusta on June 3. *Perizoma basaliata* were flying in fair numbers on Mt. Bigelow at an elevation of 3500 to 4100 ft. August 2 and 3. *Bapta vestaliata* was first seen at Belgrade May 16. *Eugonobapta nivosaria* was taken July 17. July 16 *Euchlæna serrata* was taken at Winthrop. *Æthalura anticaria* was first seen at North Belgrade May 17. *Spodolepis substriataria* was taken at Wilson Mills on May 31, this was a worn female which laid some eggs. *Sabulodes cachexiata* (*lorata*) was seen at Jefferson June 15, at Augusta June 18. *Abbottana clemataria* was seen at Augusta May 25. Data on *Nomophila noctuella* are: the first at Belgrade May 16, at Bar Harbor May 22, several at Bar Harbor September 30. *Pyrausta fumalis* was taken at Alfred August 9; *P. fumoferalis* was first seen at Jefferson June 15, at Kellyland August 31; *P. funebris* was taken at Jefferson May 25. *Nymphula issiusalis* was taken at Ashland July 18 and July 26, at Augusta July 24. *Pyralis constiferalis* was taken at Augusta July 15. At Ashland *Herculia olinalis* was taken. *Mineola tricolorella* was taken at Ashland July 29. At Augusta *Salebria basilaris* was taken July 15. The first *Thiodia radiatana* was taken at Jefferson June 15. *Epinotia apriliana*? was taken on a window screen at Augusta March 29. *E. nanana* was common at Augusta, the first on June 19. At Jefferson the first *Ancylis comptana floridana* was taken on May 25. The usual form of *Sparganothis xanthoides* was taken at Kellyland on July 29. *Argyrotænia pinatubana* was taken at Jefferson May 25. *Aristotelia rubi-*

della was taken at Kellyland July 25. At Augusta the first *Plutella porrectella* was seen June 16.

QUEBEC

P. H. H. GRAY had a successful season at Baie d'Urfé, and submitted detailed collecting data for about 250 species. His list is on file with the Society.

Contributors (those reporting directly only): OTTO ACKERMANN; A. E. BROWER; ANNETTE B. COTTRELL; GEORGE EHLE; P. H. H. GRAY; L. P. GREY; S. A. HESSEL; J. A. KEJI; C. P. KIMBALL; A. B. KLOTS; ROY LATHAM; D. J. LENNOX; F. T. NAUMANN; JUNE D. and F. W. PRESTON; C. L., JEANNE E., E. E., and P. S. REMINGTON; ROBERT ROZMAN; MICHAEL SHULGIN.

Nettleton Hollow, Washington, Conn., U. S. A.

8. FAR NORTH

by T. N. FREEMAN

The collections of Lepidoptera made in the Far North during 1952 were so few, and so far removed from previously investigated localities, that comparisons with other years cannot be made. However, to complete the sequence of this report, as it has appeared for other years, the Northern Insect Survey localities will be mentioned, and a few notes on the type and richness of fauna, will be included.

In 1952, parties were established at the following places: Naknek, Alaska; Holman, Victoria Island, Northwest Territories; Mould Bay, Prince Patrick Island, Northwest Territories; Coral Harbour, Southampton Island, Northwest Territories; Ogoki River, northern Ontario; and Sonde Stromfiord, Greenland.

Lepidoptera, particularly butterflies, were scarce at Naknek, those captured were essentially boreal forest species. The Holman collection was fairly rich for an Arctic locality with the usual arctic species being represented. Mould Bay is situated so far north that Lepidoptera are represented only by a few individuals of a few arctic species. Coral Harbour is another arctic locality, that supports a fairly rich lepidopterous fauna. Ogoki River approximates Sir Francis Walker's type locality, Albany River. This region lies well within the boreal forest and supports a rich fauna of boreal Lepidoptera. Sonde Stromfiord, on the west coast of Greenland, at approximately Lat. 68° contained a very limited representation of essentially palaearctic, boreal Lepidoptera. The absence of trees in southern Greenland, and the presence of boreal types of insects, differs remarkably from the situation in northern Canada.

Division of Entomology, Science Service, Ottawa, CANADA

OBSERVATIONS ON THE LIFE HISTORY OF *CALEPHELIS BOREALIS*. PART I.

by WORTH S. RANDLE

The author began his studies of the life history of *Calephelis borealis* in 1938, despite the fact that eminent authorities insisted then as now (Klots, 1951) that the *Calephelis* indigenous to southwestern Ohio must be *C. muticum* MCALPINE, not *C. borealis* GROTE & ROBINSON. Since the life histories have been described for *C. borealis* by DOS PASSOS (1936) and for *C. muticum* by MCALPINE (1938), there remains no reason for doubt of the presence of *C. borealis* in this area.

Subsequent to the author's first experiences with *C. borealis,* STEPHEN B. SMALLEY, science teacher in Cincinnati's Mt. Washington School and well-known lepidopterist in the area, undertook some studies of his own, and in 1950 both he and the author set out to collect more data on this interesting species. Gravid females were captured and induced to oviposit. Upon hatching, two sets of larvae were raised under separate conditions. Meanwhile the author made a series of observations on the life history of *C. borealis* in its natural habitat. The purpose of this paper is to present our observations in detail and to discuss comparisons of larval development in three different environments as a preliminary to future detailed studies of phases in the life-history of this insect.

DEVELOPMENT IN NATURAL CONDITIONS

In the literature on *Calephelis borealis* there is a paucity of information from the field. Mr. DOS PASSOS mentions the discovery of "six larvae found on plants as late as September 26th . . . quite small, rather dormant and apparently preparing to hibernate. However, only three of these could be found the following spring and they were dead."

On September 18, 1950, a fair day with a temperature of 80° F., the author found nine larvae of *C. borealis* on the underside of leaves of *Senecio obovatus* Muhl., and on the 26th four additional larvae were located. These larvae were in several positions on the leaves, but usually were found nearer the base of the spatulate part of the leaves, close to and parallel with the main vein. Two of the larvae had just molted and were eating exuviae, one had just finished eating most of its exuviae and was resting, and a fourth was very dark and almost ready to molt. A fifth larva was very white, in the first stage of molting. Their lengths were from 4 to 5.5 mm. which are the same measurements both DOS PASSOS and the author record for the fourth or fifth instars of artificially-raised specimens. All larval positions were marked and mapped, and a total of twenty-three visits were made to this marked area to study the development of *C. borealis.*

Growth of the larvae was very slow. On September 23 they measured 5 to 6.1 mm., and on this date one was found dead with minute beetles feeding on the remains. On September 26 with a high temperature of 68° four of the larvae could not be found. Two larvae were 7 mm. in length. On September 30 it was again a fair 80° day, and all larvae were back in their places.

The two larvae which measured 7 mm. on the 26th were reduced to 6.5 mm. and were very white. On October 4th these two had just molted, and one had already eaten the exuviae. Thus, four days elapsed from the time the larvae had voided preparatory to the molt and the completion of ecdysis. Eight larvae were missing on October 4 when the temperature registered a drop to a 41° low with a 56° high reading, and on the 5th with the same temperatures all but one were gone. This larva was observed as it moved to a point ten inches from its foodplant. It then disappeared while the author's back was turned, probably into some crevice in the earth, as it could not be located by overturning dead leaves. On the 11th the temperature was up again to 78°, but only one of the missing had reappeared in its place. Two of the larvae measured 7mm. x 2mm. and 8.5mm., x 2mm., the maximum dimensions recorded preceding hibernation. On this same date one larva was in the shrunken, very dark condition just previous to molting; and on the 14th it had molted and moved to another leaf of the same plant. On October 18 this larva, designated No. 13 in the records, had grown and was still up on the plant leaf. On the 21st No. 13 was still up on the plant, but in a brownish, shrunken, and inactive state. No. 10 was also back on its foodplant on this date and was also in a shrunken, dark, but still responsive condition. (By responsive is meant the raising of both posterior and anterior extremities at a slight touch, the usual reaction of *C. borealis.*) On October 30 No. 10 was found on the underside of a fallen leaf eight inches from its foodplant, and No. 13 was under a dead leaf three inches from its foodplant.

Both of these larvae were removed to a place near the base of a tree where they would easily be found and where they would be shielded from the high winds of early spring which might otherwise scatter them. On January 1, 1951, these two larvae were in the same positions as they were on October 30, with the same size and color. By this date they had been subjected to two weeks of temperature below 20° and two weeks under a two-inch blanket of snow. The winter months which followed were the second most severe in the history of Cincinnati. There was snow on the ground most of that season, at one time over a foot deep.

On the following April 8, a fair day with a high temperature of 50°, one of the larvae was found on a dead leaf four inches from where it was on January 1. On April 21, the first really warm spring day, with a temperature of 73° and a high wind, both No. 10 and No. 13 were found on the same leaf four inches from where the one was found on April 8. One measured 5.5mm. and the other 4mm.; they were brownish in color and responded slightly when touched by a grass stem. The larvae were on different leaves not far removed from each other on April 26. They were unchanged and in the same location on May 1 after six days of fair weather with high temperatures of 78° to 88°; there was no indication that they had been up on growing leaves, but they may possibly have nibbled at the bases of the petioles of *Senecio* leaves. Any feeding that they might have done up to this time would have been very meager because their size and color remained unchanged. Despite a drop in temperature to 53° on May 4, by May 5 the two larvae had become active. They had eaten to the upper cuticular membrane of new leaf-shoots, had molted once, and were now light in color and 6mm. in length. When found, however, both were down on ground leaves near their place of hibernation. On May 8 the two larvae measured 10mm. and 12mm. and had eaten

large chunks of the mature leaves, cutting from the margins almost in to the midrib. They were more amber in color than the hand-raised ones which matured in the fall and were found near the base of their foodplant under a dead leaf.

Three additional larvae were located on May 8. One was found in the same place where No. 8 had been before it had disappeared the previous fall, and one was in the place marked for No. 11. The third was 4 feet from where No. 3 had last been seen. No. 8 was in the first or white stage of molt. It was brought home on its leaf for observation and remained motionless for two days. On the 11th it molted and ate most of its exuviae. This larva descended only once to a dead leaf on the ground beneath its foodplant, but on another occasion it went to a basal, yellowish leaf of *Senecio.*

On May 12 both No. 10 and No. 13 were very white. Both measured 10 mm. One was under a dead leaf and the other under a basal leaf of the plant it had been feeding on. No. 3 measured 9 mm. and was found under a dead leaf. No. 11, also 9 mm., was three inches away from the plant on which it had been feeding when seen on May 8 and was under a dead leaf. When examined on May 15, No. 10 had just molted and had eaten part of the exuviae; it was under the same dead leaf as on the 12th and measured 12mm. No. 13 was up on a plant leaf, and its exuviae were found intact on the basal leaf where this larva had been on the 12th; it was 10 mm. long. No. 3 still measured 9mm.; it had molted, had eaten some of the exuviae, and had moved up to a leaf near the bottom of the foodplant. No. 11 was now 15 mm. in length and was on a *Senecio* leaf. Another larva, presumably No. 12, was found very near to No. 11 on a leaf of its plant and measured 11.5 mm.

A search of the marked area on May 24 disclosed only two larvae. There was no sign of the others anywhere near their foodplants. Nos. 3 and 12 were near their foodplants on undersides of dead leaves; they were shrunken and very white as if ready to pupate. On May 30, No. 12 was located on the underside of a very stout, dead leaf held up well above the earth by other dead leaves beneath it. The leaf was coated with silk, and a strand of silk was fastened around the shrunken and white larval body. After inspection this leaf was put back in place, although the exact plane of the leaf had not been noticed before it was moved. No. 3 had moved from its position of May 24 and could not be located nearby. When the author visited the study area again on June 3, he could not find No. 12. It had left its position of May 30 after being disturbed, just as had No. 3 also, even though it had been in advanced stage of transformation into the pupa. After a period of search a larva almost ready to pupate was found two feet away from where No. 3 was when examined on the 24th of May. It gave every appearance of being larva No. 3. It was placed in a jar and brought home and had transformed into a chrysalis by 9:30 P.M. The imago emerged on June 16 after a period of thirteen days in the pupal stage.

The habitat of the study area was a somewhat rocky, steep, north-south slope facing east. It consisted of very brushy pastureland, covered with Hawthorne, Pawpaw, various other saplings, briar, Honeysuckle, and Poison Ivy. It was located along the margin of a mature mixed-mesophytic woodland and

was about 250 feet distant from and about 35 feet above a permanent stream. In this location *C. borealis* was first discovered in 1937. Subsequently this butterfly was found by SMALLEY and the author in a few other widely separated places in the same type of habitat.

Records from the study area showed that the flying period for this latitude was from somewhat after the middle of June to somewhat after the middle of July. In 1950 and 1951 *C. borealis* was seen in numbers on June 27, and a few worn specimens were taken on July 28. Thus the total period in which imagoes were flying must have been a month and a half. Generally speaking, adults are inactive butterflies, sitting on leaves of weeds and shrubs for long periods of time basking in the sun with wings outstretched. The males are the more active, sometimes flying up in the air to dispute the intrusion of another male or some other winged insect. On two occasions the author watched individuals crawl around to the undersides of leaves when hard pressed and at other times they dropped low into the cover of vines on the ground or into tall grass. SMALLEY has observed imagoes on the underside of foliage on at least twelve occasions. Upon alighting they usually spread out their wings horizontally.

Careful observation of this area during all seasons indicated that *C. borealis* hibernated in the larval stage, probably in the sixth instar. Never was this insect seen flying before mid-June nor after the first week of August. No larvae of anywhere near pupating size were found in the fall.

(*to be continued*)

University of Cincinnati, Cincinnati, Ohio, U. S. A.

ACTION ON NOMENCLATURE AT COPENHAGEN

The Colloquium on Zoological Nomenclature at Copenhagen, Denmark, which was arranged by the Secretary of the International Commission on Zoological Nomenclature (see *Lep. News* 7: p.32) was able to deal with the entire agenda of seventy items when it met in August just prior to the start of the Fourteenth International Congress of Zoology. THE OFFICIAL REPORT OF THE COLLOQUIUM IS BEING PUBLISHED IN BOOK FORM AND WILL BE AVAILABLE IN NOVEMBER. SUBSIDIZED IN ORDER TO PUT IT WITHIN REACH OF EVERY TAXONOMIST, THE PRICE WILL BE ONLY 75¢ (5 SHILLINGS). ORDERS WITH REMITTANCE MAY BE SENT IMMEDIATELY TO THE *INTERNATIONAL TRUST FOR ZOOLOGICAL NOMENCLATURE, 41 QUEEN'S GATE, LONDON, S.W. 7, ENGLAND.* Every taxonomist should have this important reference booklet.

The Copenhagen Congress, in unanimously adopting the Report, advised authors to apply the decisions to their work as soon as the Report is published, although these decisions will not formally come into force until they have been embodied in the revised International Code for which publication will necessarily require considerable time. Lepidopterists interested in nomenclature, and disturbed over the violent controversy which followed the 1948 Paris Congress, will be pleased to learn that the draft of the revised Code will be published in order to allow nomenclature specialists everywhere to review it very carefully before the final issuance of the revision.

C. L. REMINGTON

MORE BUTTERFLIES FROM ALASKA AND THE HIGHWAY

by MARION E. SMITH

The article by P. S. REMINGTON on butterfly collecting along the Alaska Highway (*Lepid. News* 6: 103-106) appeared in print just as I was compiling this list of the species collected during the summer of 1952 in the same area. Since we were able to collect in several areas (notably in Mt. McKinley National Park) not visited by Mr. REMINGTON, we obtained many additional species and further records of others.

Our party of five (with Dr. C. P. ALEXANDER, DAVID L. CARSON, and myself doing the entomological collecting) left Edmonton, Alberta, in two cars on June 21, covered most of Alaska's highways, and returned through Dawson Creek, B. C., by August 11. We travelled slowly, camping en route, and collecting (when the weather permitted) at every likely spot. Although we did considerable general collecting, we were concentrating on Diptera, and the butterflies did not receive as much attention as did, for instance, the craneflies and mosquitoes, of which there was no dearth. Hence the records are spotty, with many gaps due to lack of collecting and observation and not necessarily to the absence of the species.

The best collecting, resulting in nine species (*Parnassius, Oeneis, Erebia, Boloria,* and *Pieris*), was near Sable Pass, in Mt. McKinley National Park, Alaska. This was typical tundra country, at an altitude of between 3000 and 4000 feet. Here a small stream, a foot or two wide, and a foot deep in occasional pools, drained a boggy hillside (and yielded one Arctic Grayling per pool). The banks of the stream, and the low, wet places which it drained, were vivid with a mass of flowers in bloom—Forget-me-not, Shooting Star, saxifrages, legumes, and many others, with occasional thickets of shrubby willows. Only a small number of the butterflies seen in this area were taken, although representatives were probably secured of most or all of the species. It is surprising, however, according to a note from Dr. A. B. KLOTS, that *Boloria pales* D. & S. was not taken here.

Liard Hot Springs, B. C., at mile 496.5 of the Alaska Highway, yielded only three species, but butterflies and Odonata were very abundant over the great stretches of shallow open swamp, and intensive collecting should give good results for the boreal forest species. Very conspicuous were scores of the little Geometrid, *Eulype hastata* L., which was active along the paths and at the edges of the woods. Here in this isolated area of Hot Springs and the accompanying lush and tropical-like vegetation, which is in such marked contrast to the surrounding spruce forests, occur species of plants which are some hundreds of miles north of their normal range. Indications are that insect species may likewise be isolated here, far north of their known habitats. *Boloria toddi* Holl., which occurs in the United States and in southern Canada, is a case in point. So is the small damselfly, *Ischnura damula* Calvert, which was taken in numbers at the Springs; Dr. E. M. WALKER writes that the species is known in Canada only from Manitoba and Saskatchewan, and that its presence in northern British Columbia is of great interest, presenting somewhat of a problem in distribution. Dr. C. P. ALEXANDER suggests that such species as these may be relicts of a one-time northward extension of a more tropical climate, much as *Oeneis melissa*

semidea (Say) and other mountain Arctics are thought to be relicts of a former southern extension of the cold climate of the last Ice Age. Further collecting at these Hot Springs is certainly indicated.

On the trip southward in August, Swede Johnson Creek, at mile 1119, Yukon Territory, yielded good results (8 species, mostly Blues and Yellows). This was a gravel bank area, with typical late summer flowers such as Fireweed, Yarrow, and Wild Carrot.

Dr. KLOTS, who kindly identified most of the specimens and arranged for the identification of the others, and to whom we are greatly indebted, writes: "Some of the specimens show, even with the few specimens caught, the transition from one subspecies to another that I have been suspecting all along . . . In going up the Alaska Highway you went from one subspecific area to another, and, of course, got material from intermediate locations. This simply means something of a clinal nature, but we have not yet seen enough material to be sure of these clines; in some cases there may be different species involved. We will have to wait for revisionary work."

In the following list, abbreviations are used as follows:
AH—Alaska Highway; BC—British Columbia; Cr.—creek; DLC—DAVID L. CARSON; H—highway; L—Lake; McK. Park—Mt. Mckinley National Park, Alaska; MES—the author; Spr.—springs; YT—Yukon Territory; numbers such as AH 1363 refer to mile-posts along the highway.

SATYRIDAE—(det. C. F. DOS PASSOS, except *Erebia,* det. P. R. EHRLICH)

1. *Coenonympha mixturata* Alph.—AH 1143 YT, July 7 (MES).
2. *Cercyonis oetus* Edw.—Blueberry, AH 102 BC, Aug. 10 (MES).
3. *Oeneis chryxus chryxus* D. & H.—Whirlpool Canyon, AH 538.5 BC, June 28 (MES); Marshall Creek, AH 1006 YT, July 4 (MES).
4. *Oeneis jutta alaskensis* Holl.—Liard Hot Springs, AH 496.5 BC, June 28 (DLC)—2; Miles Canyon, Whitehorse, AH 915 YT, July 4 (DLC).
5. *Oeneis brucei yukonensis* Gib.—Sable Pass, McK.Park, July 20 (MES).
6. *Oeneis mckinleyensis* dos Passos—same—9.
7. *Erebia theano alaskensis* Holl.—same—3.
8. *Erebia youngi rileyi* dos Passos—same—2.
9. *Erebia rossii gabrieli* dos Passos—Polychrome Pass, McK. Park, July 16 (MES)—male topotype; Kantishna, near McK. Park, July 17, (DLC).
10. *Erebia disa* near *mancina* Westw.—Loblolly Swamp, AH 848.5 YT, July 3 (DLC)—2; AH 1146 YT, July 7 (MES).
11. *Erebia epipsodea remingtoni* Ehrlich—Bear Cr., AH 1363, Alaska, July 9 (DLC).

NYMPHALIDAE—(det. A. B. KLOTS)

12. *Boloria eunomia denali* Klots—Sable Pass, Mck. Park, July 20 (MES)—3.
13. *Boloria chariclea "butleri"* Edw.—same—5.
14. *Boloria freija* Thunb.—same; Haines H 70 BC, July 5 (MES).
15. *Boloria frigga gibsoni* B. & B.—Loblolly Swamp, AH 848.5 YT, July 3 (DLC).

16. *Boloria toddi* Holl.—Liard Hot Spr., AH 496.5 BC, June 28 (MES)—("a very far northern record"—ABK).
17. *Boloria titania grandis* B. & McD.—Swede Johnson Cr., AH 1119 YT, Aug. 4 (DLC)—3.
18. *Phyciodes campestris*—same—(DLC,MES)—4. *Phyciodes campestris* subsp.?—Tagish L (Carcross road) YT, July 3 (MES); AH 1357 Alaska, July 9 (MES)—3; Bear Cr., AH 1363 Alaska, July 9 (DLC).
19. *Phyciodes tharos* subsp.—Liard Hot Spr., AH 496.5 BC, June 28 (MES)—2.
20. *Nymphalis j-album watsoni* Hall—same (DLC)—2.
21. *Polygonia gracilis* G. & R.—Marshall Cr., AH 1006 YT, July 4 (MES).
22. *Limenitis arthemis rubrofasciata* B. & McD.—AH 263 BC, June 26 (DLC); Bear Cr., AH 1363 Alaska, July 9 (DLC).

LYCAENIDAE—(det. A. B. Klots)

23. *Lycaena helloides dorcas* Kby.—Swede Johnson Cr., AH 1119 YT, Aug. 4 (MES).
24. *Plebeius aquilo bryanti* Leuss.—same.
25. *Lycaeides melissa scudderii* Edw.—same; Gulkana R., Richardson H., Alaska, Aug. 2 (MES)—(det. verified by V. Nabokov).
26. *Plebeius saepiolus* Bdv.—AH 195 BC, June 25 (DLC); AH 340 BC, June 26 (DLC); AH 932 YT, July 4 (DLC); Haines H 93 BC, July 5 (MES); Dezadeash L., Haines H 123 YT, July 5 (MES); Tagish L. (Carcross road) YT, July 3 (MES)—2; Bear Cr., AH 1363 Alaska, July 9 (DLC).

PIERIDAE—(det. A. B. Klots)

27. *Euchloe ausonides* subsp.—Kukshu Cr., Haines H. 118 YT, July 5 (MES)—3.
28. *Colias hecla* subsp. ?—same (DLC); Swede Johnson Cr., AH 1119 YT, Aug. 4 (MES).
29. *Colias philodice vitabunda* Hov.—Swede Johnson Cr., AH 1119 YT, Aug. 4 (DLC)—2 (including a white female); Bear Cr., AH 1363 Alaska, July 9 (DLC); Haines H. 93 BC, July 5 (DLC); Gulkana R., Richardson H., Alaska, Aug. 2 (MES); Kantishna, nr. McK. Park, Aug. 17 (DLC).
30. *Colias christina* subsp.?—Swede Johnson Cr., AH 1119 YT, Aug. 4 (DLC & MES)—3.
31. *Colias palaeno chippewa* Kby.—AH 1346 Alaska, July 9 (DLC).
32. *Colias nastes alaskae* B.-H.—Toklat R., McK. Park, July 20 (MES).
33. *Colias boothii* Curt.—same.
34. *Pieris napi hulda* Edw.—Haines H. 93 BC, July 5 (MES); Eagle Summit, Steese H 107 Alaska, July 12 (DLC)—4; Sable Pass, McK. Park, July 20 (MES); Kantishna, nr. McK. Park, July 17 (MES)—2; Anchor R., Sterling H., Alaska, July 25 (MES)—4.
35. *Pieris bryoniae pseudobryoniae* Verity ?—Kern Cr., Seward-Anchorage H., Alaska, July 23 (MES).

PAPILIONIDAE—(det. A. B. KLOTS)

36. *Papilio glaucus canadensis* R. & J.—AH 253 BC, June 25 (MES); AH 588 BC, June 28 (DLC)—many: 20 in one sweep.
37. *Papilio machaon aliaska* Scud.—Kukshu Cr., Haines H 118 YT, July 5 (MES); Polychrome Pass, McK. Park, July 20 (MES).
38. *Parnassius eversmanni thor* Hy. Edw.—Sable Pass, McK. Park, July 20 (MES)—3; a few others seen here, but not abundant.

HESPERIIDAE—(det. A. B. KLOTS)

39. *Erynnis persius avinoffi* Holl.—Bear Cr., AH 1363 Alaska, July 9 (DLC).

In conclusion, we are all anxious to return for further collecting in this region. True, the roads leave much to be desired, and the continual cloudy weather or drizzle ("most unusual", according to some; "quite typical", according to others!) proved most aggravating. But the scenery, the plant and animal life, and the long daylight hours make this a wonderful vacation country—particularly for the bug-collecting entomologist!

This is a contribution from the Department of Entomology, University of Massachusetts.

Fernald Hall, University of Massachusetts, Amherst, Mass., U.S.A.

NOMINATIONS FOR SOCIETY OFFICERS FOR 1954

The Nominating Committee reports the following slate of nominees for officers of The Lepidopterists' Society for 1954:

President—A. DIAKONOFF, Leiden
1st Vice President—FRANK M. JONES, Wilmington
Vice President—N. D. RILEY, London
Vice President—ANNETTE F. BRAUN, Cincinnati

Executive Council (terms expire Dec. 1956)—
JEAN BOURGOGNE, Paris
DON B. STALLINGS, Caldwell, Kansas.

The terms of the Secretary, Treasurer, and four Councillors do not expire this year. The Nominating Committee is composed of ERNEST L. BELL, AUSTIN H. CLARK, and GEORGE W. RAWSON (Chairman). Ballots will be mailed to all Society members in November.

FREDERICK H. RINDGE, Secretary

AIDS TO DISTINGUISH BETWEEN FEMALES OF THE "WINTER-MOTHS", *ALSOPHILA POMETARIA* AND *OPEROPHTERA BRUCEATA* (GEOMETRIDÆ)

by P. H. H. Gray

The following notes may help the beginner to distinguish between the wingless females of these two species, both of which emerge from the chrysalis in the ground at the base of trees at the same time in the fall. Some of the information provided by Forbes (1948) is helpful, some confusing. The quotations below are from that author's Memoir.

1. Imago wingless, covered with bronze and white scales, white predominating; hind tibia shorter than tarsus, with a paired spur at the end of the thickened distal third; eyes brown; head with frontal concavity.. *Alsophila pometaria* Harris
2. Imago with short wing-pads; scaling bronze and white, bronze predominating; hind tibia longer than tarsus, with two paired spurs in line, distal third not thickened; eyes black, with blue-green iridescence; front of head convex .... *Operophtera bruceata* Hulst

According to Forbes (p. 158) the female of *O. bruceata* is "luteous, with head and most of the body covered with vague fuscous blotches."; that, however, does not agree with the color character given in the key on p. 13, where the moth is to be identified as "brown". "Luteous" means golden-yellow. *A. pometaria* is stated (p. 15) to be "gray, unmarked". The general appearance is gray, but all specimens caught here are visibly brown behind the thorax; this is due to less heavy white scaling on the first abdominal segment. The scales lie close to the cuticle, and give the moth a smooth appearance. In *O. bruceata* the general appearance is brown but not distinctly so; the scales are attached at various angles, giving the moth a rough and wrinkled appearance.

The antennae of the male *A. pometaria* are stated to be "heavily serrate and fasciculate"; the female antennae are not described. The antennae of *O. bruceata* are "heavily ciliate", but it is not stated if that applies only to the male or to both sexes. "Female with head characters as in the male" might lead a beginner to assume that the antennae are the same in both sexes. In this locality the antennae of the females of both species appear under a low-power hand lens to be filiform, but under a higher power those of *O. bruceata* are distinctly serrate.

The female of *Paleacrita vernata* Peck has often been confused with the above two species. It may emerge before winter. "Fall emergences are rare, but [captures of this species and their misidentification] are partly to blame for the general confusion with the fall canker-worm." (Forbes, p. 68). The facies of the males of these three species are distinct enough, and the antennae of ♂ *P. vernata* could not be confused with those of the other two species. It would seem that the only good distinctive character is the possession by *P. vernata* of bristles overlying the scales of the body.

Out of about 250 specimens of females taken last fall from Ash, Elm, and Maple in my garden and nearby, only 5 are *O. bruceata,* one of them *in cop.* One has its wing-pads spread out. About ten males of the two species were taken. One female of *A. pometaria* has the left antenna of the

male sex, the right female. Another has two male antennae, and the right hind tibia with two pairs of spurs in line, as in *O. bruceata.* Several otherwise normal females of *A. pometaria* have a third, generally short, spur on one or both hind tibiae.

Reference

Forbes, W. T. M. 1948. Lepidoptera of New York and neighboring States, Part II. *Cornell Univ. Agric. Exp. Sta. Memoir* 274: 263 pp., 255 figs.

Box 236, Macdonald College, P. Q., CANADA

REVIEW

MICROLEPIDOPTERA OF NEW GUINEA. Results of the Third Archbold Expedition (American-Netherlands Indian Expedition 1938-1939). Part I. By A. Diakonoff. *Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Natuurkunde, Tweede Reeks,* Deel XLIX, No. 1: pp. (1)—167, 1 pl., 1 map, 208 figs. Amsterdam, 1952.

The present work is the first part of a voluminous report on Microlepidoptera collected by the above-mentioned expedition in the mountainous region of Central New Guinea, the fauna and flora of which have been hitherto very little known. The completed work promises to bring a revision of all lepidopterous families usually known under the collective name Microlepidoptera with the exception of the superfamily Pyraloidea of which latter the report includes only the family Alucitidæ.

Extensive materials on Microlepidoptera collected by the expedition comprised about 1400 specimens belonging to 582 species and subspecies of 30 families of which 1 family, 67 genera, 516 species and 10 subspecies were new.

In the published part of the report the families Alucitidæ (11 spp.), Phaloniidæ (2 spp.), and a part of Tortricidæ (100 spp.) are treated; 6 genera, 94 species, and one variety are described as new. Of some species already known in one sex the other sex is described. Besides the new descriptions, the keys to the Papuan genera and species are given; in these keys not only the presently revised species but also those already known from New Guinea are included. In this way the report is of greatest importance for all students of the Papuan fauna and taxonomists.

The illustrations are very accurate and numerous. The text figures represent wing neuration, heads, and genitalia of all new species and of many little known ones. A map represents the area visited by the expedition; another map gives the distribution of the genus *Zacorisca* Meyr. Plate 1 represents *Chionothremma placida,* gen. & spec. nov., photographed on the sand in nature.

The family Tortricidæ, very rich in species in New Guinea, is considered by the author *sensu lato, i. e.,* with the inclusion of Eucosminæ as a subfamily on an equal level with Tortricinæ. This may be noted as a new systematical view of the author who in his former publications was a strong adherent of the separation of Eucosmidæ as an independent family. "The relation of these two tortricoid groups," the author writes now about Tortricinæ and Eucosminæ, "is indeed very close and there are no 'absolute' characters available for their separation", and further: "for a more natural classification the two groups have to be united as one family." For an exact explanation of the systematical views of the author it might be added that the family Tortricidæ did not include (as the author explained) Ceracidæ, Schœnotenidæ, and Melanalophidæ, none of which was reviewed in the publication under consideration.

As for the remaining parts of the work, we shall have an opportunity to abstract them as soon as they are published.

NICHOLAS S. OBRAZTSOV, 11 Cromwell Pl., Sea Cliff, Long Is., N. Y., U. S. A.

RECENT LITERATURE ON LEPIDOPTERA

B. SYSTEMATICS AND NOMENCLATURE

d'Almeida, R. F., "Algunas consideraçoes sôbre os gêneros *Mechanitis* Fabr. e *Melinæa* Huebn. (Lep. Ithomiidæ)" [in Portuguese]. *Bol. Mus. Nac. Rio de Janeiro,* no.100: 27 pp., 5 pls. 31 Jan. 1951. Describes as new *Mechanitis egaënsis obumbrata* (Alto Rio Juruá, Territorio do Acre), *M. travassosi* (Territorio do Acre), *M. oiticicai* (Obidos, Pará), *M. fallax pothetoides* (Rio Verde, Matto Grosso), *M. foxi* (Alto Rio Juruá, Territorio do Acre); *Melinæa mayi, M. acræana, M. hicetas eryx* (all Alto Rio Juruá, Territorio do Acre), *M. madeira æquatoriensis* (Ecuador). Also describes a variety of *Melinæa mænius.* Figures adults. Notes on related species and subspecies. Checklist of species and list of specimens examined. [P.B.]

Brower, A. E., "Comments on the editorial 'The components of an adequate paper describing a new species.'" *Lep. News,* vol.6: pp.37-40. 8 Aug. 1952.

Brower, A. E., "Three new species of Microlepidoptera (Olethreutidæ, Glyphipterygidæ and Yponomeutidæ." *Ann. Ent. Soc. Amer.,* vol.46: pp.95-98, 1 fig. Mar. 1953. Describes as new *Aphania paludicolana* (Southwest Harbor, Me.); *Hilarographa jonesi* (Martha's Vineyard, Mass.); *Argyresthia aureoargentella* (Mariaville, Me., bred from *Thuja occidentalis).* Figures adults. [P.B.]

Boursin, Ch., "Description de nouveaux *Leucania* d'Afrique tropicale et races marocaines de ceux-ci. (Lep. Phalænidæ(Agrotidæ) Hadeninæ)" [in French]. *Ann. & Mag. Nat. Hist.,* ser.12, vol.5: pp.393-399, 3 pls. Apr. 1952. Describes as new: *L. joannisi* (Gambia); *L. j. arbia* (Sidi Oueddar, Morocco); *L. panæthiopica* (Tananarive, Madagascar); *L. p. palæarctica* (Salé, Morocco); *L. decaryi* (Tananarive, Madagascar). Figures adults and ♂ genitalia of these and some related spp. [P.B.]

Bradley, J. D., "*Adoxophyes orana* (Fischer von Roesslerstamm, 1834) (Lepidoptera, Tortricidæ)." *Entomologist,* vol.85: pp.1-4, 1 pl. Jan. 1952. Redescribes sp., figuring adult, venation, and genitalia; recent introduction in Britain. [P.B.]

Capps, Hahn W., "A new genus and species associated with orchids from Mexico (Lepidoptera: Chrysaugidæ)." *Bull. So. Calif. Acad. Sci.,* vol.51: pp.1-3, 1 pl. 30 Apr. 1952. Describes as new *POTOSA rufofascialis* (Maiz, San Luiz Potosi). [P.B.]

Clarke, J. F. Gates, "Host relationships of moths of the genera *Depressaria* and *Agonopteryx,* with descriptions of new species." *Smithson. Misc. Coll.,* vol.117, no.7: 20 pp., 6 pls. 23 Apr. 1952. Describes as new *D. angelicivora* (McDonald Pass, Montana); *D. pteryxiphaga* (Ten Sleep, Wyoming); *D. armata* (Slate Peak, Whatcom Co., Washington); figures genitalia. Lists food plants of these spp. and 9 others from the western U. S., and discusses host specificity in the genera. [P.B.]

Collenette, C. L., "Notes on the genus *Lacipa* Walker (Heterocera, Lymantriidæ)." *Ann. & Mag. Nat. Hist.,* ser.12, vol.5: pp.383-390, 11 figs. Apr. 1952. Describes as new: *L. pulverea ephala* (Dar-es-Salaam, Tanganyika); *L. sexpunctata leuca* (Marungu Plateau, Tanganyika); *L. megalocera* (Ft. Crampel, French Congo); *L. neavei* (Mt. Mlanje, Nyasaland); *L. elgonensis* (Mt. Elgon, Uganda); *L. compta* (Mansya R., N. E. Rhodesia); *L. exetastes* (Zomba, Nyasaland). Figures ♂ genetalia of these and several others. Key to most of the known spp., and notes on the remaining five. [P.B.]

Field, William D., "Moths of the genus *Paramulona* Hampson." *Proc. U. S. Nat. Mus.,* vol.101: pp.489-496, 2 figs. 1951. Describes as new: *P. baracoa* (Baracoa, Oriente, Cuba); *P. schwarzi* (Cayamas, Sta. Clara, Cuba). Figures genitalia of all four spp. of this endemic genus, and gives a key to them. [P.B.]

Kuhn, Oskar, "Ein vermutlicher Schmetterling, *Geisfeldiella benkerti* n.g. n.sp. aus dem Liasϵ_1 Nordfrankens" [in German]. *Neues Jahrb. f. Geol. u. Paläont.,* Jahrg. 1951: pp. 58-61, 2 figs. 1951. New genus and species named from one fossil wing taken from the Lias near Geisfeld, Germany. Photo not clear; drawing partly imaginative. Specimen probably not Lepidoptera. [C.R.]

F. BIOLOGY AND IMMATURE STAGES

Evans, William H., "Notes on *Anthocaris sara* and *reakirti.*" *Lep. News,* vol.6: p.106. 19 Feb. 1953.

Raffy, Anne, "L'auto-stérilization chez les chrysalides de *Bombyx mori* L." [in French]. *C. R. Acad. Sci.,* vol. 231: pp. 1345-1346. 6 Dec. 1950. Intestinal bacteria of larvae disappear shortly after pupation; cause unknown, but no antibiotic substance was found. [P.B.]

del Rivero, J. M., "Contribución al conocimiento de los medios de lucha contra la "Piral" de la vid (*Sparganothis pilleriana* Schiff.)" [in Spanish]. *Bol. Patol. Veg. Ent. Agric.,* vol. 17: pp. 261-290, 11 figs. 1950. Biology and control; all stages figured. [P.B.]

Rosier, J. P., "Metamorphosis of some Javanese butterflies." *Idea,* vol. 9: p. 26. 31 Dec. 1951. Notes on life history of *Poritia erycinoides* Feld. (Riodinidæ). [A.D.]

Ruiz Castro, Aurelio, "La lucha contra las plagas del viñedo en Espana" [in Spanish]. *Bol. Patol. Veg. Ent. Agric.,* vol. 17: pp. 111-162., 23 figs. 1950. Lists 17 Lepidoptera attacking grapes; biology and control of *Celerio lineata, Sparganothis pilleriana, Polychrosis botrana* and *Clysia ambiguella.* [P.B.]

Sala, Frank P., "Field notes on diurnal moths of the genus *Annaphila.*" *Lep. News,* vol. 4: p. 71 "1950" [Mar.1951].

Schultz, Victor G. M., "Neue Beiträge zur Schmetterlingskunde. Nr. 10. Über *Homœosoma pseudonimbellum Bentinck* (erste Stände und Generationsfolge) (Lep. Pyralidæ)" [in German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 55-59, 1 fig. 30 June 1951.

Schwartz, Rudolph, "Sur la polyphagie de *Coleophora onopordiella* Z." [in Czech, French summary]. *Ann. Soc. Ent. Čechoslovenicæ,* vol. 47: pp. 177-186, 2 pls. 1 Oct 1950. Records the species from 7 spp. of plants besides *Onopordon.* [P.B.]

Sevastopulo, D. G., "Field notes from East Africa (11)." *Entomologist,* vol. 83: pp. 209-211. Sept. 1950.

Sevastopulo, D. G., "Food plant of *Delias eucharis* Drury." *Journ. Bombay Nat. Hist. Soc.,* vol. 49: p. 571. Dec. 1950. Normally *Loranthus* sp.; recorded from *Citrus.* [P.B.]

Sevastopulo, D. G., "Field Notes from East Africa (5)." *Entomologist,* vol. 84: pp. 67-68. Mar. 1951. Notes on 19 spp. of Lymantriidæ. [P.B.]

Showler, A. J., "Oviposition of *Argynnis euphrosyne.*" *Entomologist,* vol. 84: pp. 140-141. June 1951. Oviposition random on objects near food plant. [P.B.]

Skala, Hugo, "Minen aus Steiermark, gesammelt von Fritz Hoffman" [in German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 119-126. 1 Aug. 1951. List of mines of Lepidoptera etc., by host plant. [P.B.]

Smith, Kenneth M., & Ralph W. G. Wyckoff, "Structure within polyhedra associated with insect virus diseases." *Nature,* vol. 166: pp. 861-862, 5 figs. 18 Nov. 1950. Diseases studied in various caterpillars. [P.B.]

Stallwood, B. R., "Observations on the oviposition of *Fabriciana cydippe.*" *Entomologist,* vol. 84: p. 29. Feb. 1951. On twigs near food plant. [P.B.]

Swezey, Otto H., "Notes on the occurrence and biology of the Honeysuckle Leaf Miner, *Swezeyula loniceræ,* in Hawaii." *Proc. Hawaiian Ent. Soc.,* vol. 14: pp. 197-200, 5 figs. Mar. 1950. Describes and figures early stages; records 3 parasites. [P.B.]

Thompson, Clarence B., "A granulosis of the Imported Cabbageworm." *Journ. Econ. Ent.,* vol. 44: p. 255. Apr. 1951. *Pieris rapæ.*

Tressens, F., "Notes biologiques et captures" [in French]. *Rev. Franç. Lépid.,* vol. 12: p. 215. "Jan.-Feb." [12 July] 1950. Butterflies, Tarn-et-Garonne.

Valkeila, Erkki, "Notes on the Lepidoptera of Hameelinna and its neighborhood (EH)" [in Finnish, English summary]. *Ann. Ent. Fennici,* vol. 15: pp. 157-160, 2 maps. 14 Jan. 1950. Notes on biology and distribution of *Nonagria maritima, Sideridis obsoleta* and *Toxocampa viciæ;* some other records, mostly Noctuidæ. [P.B.]

Various authors, "Notes and exhibitions." *Proc. Hawaiian Ent. Soc.,* vol. 13: pp. 199-222, 319-341; vol. 14: pp. 1-20, 203-227. Apr. 1948, Mar. 1949, Mar. 1950, Mar. 1951. Notes on occurrence and biology of Hawaiian insects, including many Lepidoptera. [P.B.]

Williams, J. R., "The bionomics and morphology of *Brenthia leptocosma* Meyrick (Lep. Glyphipterygidæ)." *Bull. Ent. Res.,* vol. 41: pp. 629-635, 13 figs. Feb. 1951. Habits and morphology of all stages are described. 9 parasites are listed. Food plant *Cordya* spp. Moth confined to Mauritius. [P.B.]

Woodroffe, G.E., "A life-history study of the Brown House Moth, *Hoffmannophila pseudospretella* (Staint.) (Lep., Œcophoridæ)." *Bull. Ent. Res.,* vol. 41: pp. 529-553, 3 pls., 5 figs. Feb. 1951. Morphology and biology of all stages are described in detail, with special reference to diapause, effects of temperature and humidity, and ♀ longevity and fecundity. 3 predators and 4 parasites are recorded. Moth is omnivorous. [P.B.]

NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Notices will continue to appear until forced out by newer ones. We cannot guarantee any notices but expect all to be *bona fide.* **Please notify us of any abuse of this service.**

Wish to exchange Rhopalocera with collectors of United States and foreign countries. Have central U. S. material for exchange. Patrick J. Conway, R.R. 3, Box 127, Aledo, Illinois, U. S. A.

Wish to exchange North American Rhopalocera with other collectors. Of special interest is *Œneis melissa semidea* recently collected atop Mt. Washington. Specimens in good condition are also for sale. Philip C. Ritterbush, 20 Lafayette St., Laconia, New Hampshire, U. S. A.

Wish to **exchange Rhopalocera** from all over the world. Wanted esp. Papilionidæ (*Parnassius, Papilio, Graphium*), Pieridæ and Nymphalidæ. Masaki Nakayama, 1-398 Fujikonmachi, Wakamatsu-City, Fukuoka-Pref., Kyushu, JAPAN.

Lepidoptera offered in exchange for beetles of the family Staphylinidæ, esp. subfamily Omaliinæ. Prefer to trade off whole families, or large generic units (such as *Speyeria).* David H. Kistner, 5031 N. Kolmar Ave., Chicago 30, Ill., U. S. A.

Wish to purchase Noctuidæ from all parts of the world, or will give in exchange butterflies from Italy. Dr. E. Berio, Museo di Storia Naturale, Via Brigata Liguria 9, Genova, ITALY.

A new exchange system to help collectors get common material from out-of-the-way places is being established, with lots of 100 papered specimens with *full data* to be sent to this collector. Prompt return of exchange made. Nymphalidæ esp. desirable. Write for arrangements: Raymond J. Jablonski, 1018 E. Ogden Ave., Milwaukee 2, Wis., U. S. A.

Wish to exchange California butterflies with collectors all over the world. Will offer *Euphydryas editha bayensis* in large quantity. Especially desire contacts with Africa, China, Australia and Indonesia. Will take other California species in exchange for the *E. editha bayensis.* Donald L. Baber, 1511 Drake Ave., Burlingame, Calif., U. S. A.

BOOKS FOR SALE (all new): *Butterflies of Southern Africa - Where, When and How They Fly* by D. A. Swanepoel, 1953, De Luxe Edition $14.70, Regular Edition $10.50; *Butterflies of Rhodesia* by E. C. G. Phinhey, 1949, $3.25; *Butterflies of California* by J. A. Comstock, $9.00. D. Neumann Jr., 3066 Georgia St., Oakland 2, Calif., U. S. A.

LIVING MATERIAL

Would like to **buy living cocoons, pupæ, ova,** etc. of N. American Rhopalocera (especially Papilios), Saturniidæ, and Sphingidæ. Stephen Hilliard, 25 Beech St., Framingham, Mass., U. S. A.

Wanted urgently: pupæ of *Papilio bairdii, P. indra, P. brevicauda,* and *P. nitra.* Good prices paid or will exchange for British species. Dr. C. A. Clarke, High Close, Thorsway, Caldy, Cheshire, ENGLAND.

Wanted: cocoons of Saturniidæ; pupæ of *Papilio,* Sphingidæ, Arctiidæ; fertile ova. Exchange or buy. Eugene Dluhy, 3912 No. Hamilton Ave., Chicago 18, Ill., U. S. A.

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THE LEPIDOPTERISTS' SOCIETY

REPORT OF THE TREASURER FOR THE PERIOD DECEMBER 4, 1951, TO DECEMBER 31, 1952

RECEIPTS			
Cash on hand from 1951 operations		$ 261.21	
Receipts from 1952 operations			
Regular and student memberships, library subscriptions	$1106.29		
Sustaining memberships	383.91		
Life memberships	50.00		
Sale of back issues of Lep. News and reprints of Lep. News articles	71.75		
Contributions to Illustrations Fund	72.00		
Registration fees, 1951 Annual Meeting	10.00		
Miscellaneous	2.60		
TOTAL	$1696.55	$1696.55	
GRAND TOTAL		$1957.76	$1957.76
DISBURSEMENTS			
Expenses incurred in issuing the Lepidopterists' News, remitted directly to creditors		$ 927.31	
Expenses incurred by the Editor's Office, remitted to the Editor		250.00	
Additional expenses of Special Meeting held in conjunction with the IXth International Entomological Congress at Amsterdam, August 21, 1951		40.15	
Expenses of Treasurer's Office			
Printing of dues statements	$16.75		
Postage and mailing costs	10.93		
TOTAL	$27.68	27.68	
Banking costs		9.19	
Miscellaneous		4.00	
GRAND TOTAL		$1258.33	1258.33
BALANCE, CASH ON HAND			$ 699.43

(Signed) J. BENJAMIN ZIEGLER, Treasurer

THE LEPIDOPTERISTS' SOCIETY

1953 OFFICERS

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The object of The Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

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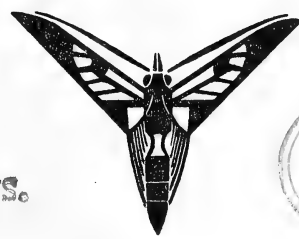

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NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.*, mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; 4) news of lepidopterology (*e.g.*, personalia, societies, new periodicals). Papers of more than eight pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; Latin names of genera and species will be italicized, and authors of such Latin names WILL NOT APPEAR IN THE TITLE of any paper. The style should conform to that used in recent issues of the *News*. Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

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OBSERVATIONS ON THE LIFE-HISTORY OF *CALEPHELIS BOREALIS*. PART II.

by WORTH S. RANDLE

DEVELOPMENT IN CAPITIVITY

Larvae raised indoors were observed under different conditions. Those raised by SMALLEY were placed in small, individual bottles or one-half ounce vials with tight caps or corks, and fresh leaves of the foodplants were added at the least sign of wilt. In this environment all but one of the 178 larvae which SMALLY has raised over a period of several years have emerged as imagoes in the fall, from late August to early November, of their larval year. The one exception acted as if it were going to hibernate but died in early November. The first brood raised indoors by the author in large bottles with cloth covers emerged in November of the larval year. Therefore, it was decided that some should be raised under conditions which would approximate the humidity and temperature variations experienced by larvae in their natural environment. The larvae were placed on leaves of *Senecio obovatus* plants growing in glass bowls in their original soil and mulch. The bowls were enclosed in a screen cage and left on a north-west windowsill where the window was left open continuously. When the larvae went down to dead leaves in the fall and remained there to hibernate, the cage and enclosed bowls were moved to a completely enclosed woodshed and left there until April. Four of the larvae successfully raised in this way hibernated in the larval stage, but two of them suddenly began to increase in rate of growth after the first week of September, pupated on October 3 and 4 and both emerged on October 30.

The larval stages and measurements for the caged larvae were much the same as those outlined by DOS PASSOS. The larvae which were raised in bottles grew very much faster. The size of imagoes, however, was smaller for SMALLEY'S "bottle"-raised larvae, which never attained the dimensions of those in nature. The larvae which hibernated did so in the sixth instar. In spring they molted twice before pupating.

There were a number of interesting observations concerning the larvae which were confined in cages. On one occasion a Neuropterous larva was discovered in the act of devouring a *C. borealis* larva. The Neuropteran must have been imported from the woodland with the *Senecio* plants. It was de-

stroyed by the author before it could prove how avid was its appetite. The larvae passed the first four molts rather consistently, but the sixth and seventh were variable both with the larvae which hibernated and those which did not hibernate. Usually the larvae raised in captivity did not wander far when they began to descend to positions under dead leaves. Twice they were observed crawling around the edge of the bowl and twice they were seen moving across several leaves before settling on one. Once, however, on November 2 a larva crawled over the edge of the bowl which had been temporarily set on a window sill outside its cage, proceeded halfway across the sill a distance of eighteen inches, and assumed a resting position on the vertical edge of the sill where it was sheltered from the direct wind coming in the open window. When it was replaced in the bowl it crawled to the underside of a *Senecio* leaf which was nearly touching the ground. On October 22 the first larva went down to earth and crawled into a curled, dead leaf beneath a *Senecio* plant, where it remained for over a week. Then it moved a short distance to another leaf, but the following day moved back to its first position again. The other three larvae also began wandering by the first of November. After descending to the ground, two of them ascended to plant leaves again for only a few hours, and then one crawled to a dead leaf on the ground and the other to a plant leaf touching the ground. There was no visible sign that any had eaten of the food plant since the first of November, and the one had not eaten since the 22nd of October. On November 5 the last one went down to hibernate, apparently into a crevice beneath the plant or between earth and side of bowl.

During ecdysis *C. borealis* larvae in captivity usually passed through an inactive period of two stages exemplified externally by a very white color phase evidently caused by evacuating the alimentary tract and by a dark color phase just preceding the molt. The duration of time spent in these stages was variable both with the larvae in nature and in captivity. For the complete process of ecdysis usually three days were required, roughly two in the white stage and one in the dark. However, with the indoor larvae there were records of a total of only two days and on one occasion only one day, and once the white stage was not even noted. From the chance records of the larvae *in situ* and the complete records of larvae in captivity, it appears that the exuviae are usually only partially eaten or left intact in the first two molts and the last two, while the exuviae are usually eaten completely in the intervening molts. There are records of larvae eating exuviae in the second molt, however; and in the molt before the pupal molt the larvae ate most of the exuviae. In the third molt none of the larvae consumed their exuviae although two "nibbled' at them, and none of the larvae ate their exuviae at the time of their first post-hibernation molt.

A most remarkable observation resulted from an acccident. On April 8 the captive larvae were removed from the shed where they had been kept during hibernation. Examination revealed that three larvae had survived the winter months; a lifeless one was found intact. They were placed on a roofless porch in the sunshine. On the 9th and 10th there was a torrential rain, and during the absence of the author the larvae had been forgotten. Great was the disappointment, therefore, when the mistake was discovered on the 11th, and the bowl which contained the larvae was found to be flooded.

After a search two of the larvae were found under submerged leaves; they were limp and apparently lifeless. The bowl was drained and the "lifeless" larvae placed on top of dead leaves and replaced in the shelter. It was most fortunate that the larvae were not discarded immediately, because on the afternoon of April 26 the bowl and its contents were again examined, and three larvae were up on one of the plants, one on a stem and the other two on leaves. Of the two on leaves, one was on the underside halfway between midvein and the margin and the other on top of the leaf. The two "dead" larvae had survived the flood, and the lost third one had reappeared. The larvae had eaten three spots about 2 mm. in diameter on the underside of a fresh *Senecio* leaf; they were slightly changed in color and measured 6 mm.

At the time of pupation both the natural and captive larvae displayed great sensitivity to any disturbance. One of the captive larvae had voided in preparation for the molt on September 27 and had taken up a position on a mat of silk on the lid of the cage when the lid was opened for periodic examination. At this intrusion the larva moved to the other end of the box lid and assumed a position similar to the first position. On the next day the cage lid was lifted very carefully for inspection, but the larva immediately moved to the other end of the box lid and assumed a position similar to the first position. On the next day the cage lid was lifted very carefully for inspection, but the larva immediately moved to a third place on the cage lid. Again the lid was lifted carefully several times as a test. On the 29th this larva then moved off the lid, went back to a leaf of *Senecio* and took up a position between the midvein and margin. Since the time when it had taken the third position on the lid it was much shrunken. It pupated on October 3 in the early morning. The behavior of this larva corresponds with that of the two natural larvae disturbed after voidance prior to pupation, as described above. The period of time required by this larva to consummate pupation was seven days. A second larva voided and began to seek a location in which to pupate on the 29th; it pupated on October 2 in the afternoon, a lapse of only four days. These intervals correspond closely with the records of the two larvae in natural environment, one of which required six days and the other nine days to effect pupation. A record was kept of the coloring of the pupa of one of the *C. borealis* larvae which hibernated. The larva transformed into a pupa at 11:00 AM. By 1:00 PM the dorsal chrysalid spots were barely discernible under the still soft, greenish-white pupal case. At 3:00 PM the spots were fairly clear and the chrysalis noticeably harder. By 6:00 PM dorsal and lateral spots were clear. Close observation of the pupa just prior to transformation into the imago disclosed the following sequence of color changes: the eye cases became rich brown and the tail region darkened slightly; next the dark brown spread to the wing cases and shortly thereafter to the whole head and in a band to the posterior extremity; and finally the actual color of the wings showed through the pupal case preceding emergence of the imago. In the first group of pupae the author observed, this color sequence required three or four days, a day for each stage. Only two days were required by other broods. The duration of time spent in the pupal stage varied from 12 days for the larvae which hibernated to 27 and 28 days for the two which developed comletely without hibernating. The one brought home from the natural

habitat after hibernating spent 13 days in the pupal state. The first brood the author raised in 1938 passed 16 to 24 days in the pupal stage.

While the egg has been described, the color changes of the developing egg have not received attention in the papers cited. During the course of development the egg changed from a pale lavender, to purple, then to a claret, and finally to a deeper shade of red. A day to two days before hatching the eggs became a waxy white. SMALLEY also noted that immediately on hatching the larvae have a claret tinge which becomes a greenish-gray as soon as they begin to eat.

The maximum length attained by a captive larva raised by the author was 17mm. x 4mm.; the others were 10 to 13mm. at maximum. The largest natural larva measured 15 mm. before it disappeared to pupate. The sizes of both groups of larvae at the time of hibernation were the same for both maximum and average. The color of the natural larvae, however, was more amber in later instars than that of the captives.

Generally the development of the author's captive larvae closely paralleled that of the natural larvae. The fact that three of the indoor larvae had not assumed hibernating positions until five to six days later than the natural ones might have been because the indoor larvae were in a more sheltered environment despite one open window.

In still other ways than have already been mentioned SMALLEY'S "bottle"-raised larvae differed from the other two groups. One year when a close record of observations was kept it was found that thirteen larvae pupated in the seventh instar after six molts, but four extended into the eighth instar after seven molts. One other larva molted a sixth time and then three days later molted again. With twenty larvae the average was six days for each of the first three instars; the average for the fourth was eight days; for the fifth instar nine and one-half days; for the sixth ten and one-half days if it pupated in that instar but only seven days if it didn't. The seventh averaged fifteen days for the four which extended into that instar. SMALLEY never observed larvae eating exuviae. He took the skins for study after a day passed, and by that time his larvae were eating leaves. However, six exuviae could not be found for larvae which should have molted; these had probably been eaten.

SMALLEY noted that after the larvae were large enough to eat the whole leaf their feces were forcibly expelled as minute, hard pellets which travelled several inches through the air. He found that moist excreta were voided only in preparation for pupation and then in only a few instances. In the last instar the larvae spit forth a greenish liquid when disturbed besides the usual raising of the extremities.

In these specimens the pupa measured 3 to 4 mm. wide and 9 mm. to 11mm. long. The larvae averaged sixteen to seventeen days in the pupal stage. The time from the coloration of the eyes of pupae until emergence of the imago was invariably six days in his experience. Of 18 which emerged one year, 11 were males and 7 females; but in other years the sexes were more evenly balanced. His males and females emerged intermittently throughout the season whereas in the field males precede females by at least a week.

In no instance were the larvae of *C. borealis* found to be gregarious. Several times both in captivity and in the natural state two larvae were seen on one leaf, but soon thereafter one moved to a different leaf.

DISCUSSION

The greatest enigma encountered in the study of *Calephelis borealis* was the complete development without hibernation of two of the larvae raised in cages under conditions which closely approximated those experienced by the insect in its natural state, especially since the larvae which did hibernate behaved so nearly like the larvae observed in their natural environment. Previously, the author and SMALLEY had believed that "bottle"-grown larvae matured without hibernation because they were provided with fresh and succulent leaves and/or constant conditions of temperature and humidity, but the behavior of the above two larvae erased any easy explanation of causes for their sudden increase in rate of growth and maturation while others raised along with them developed normally. The determining threshold must be very narrow.

The factors which cause the local distribution of *C. borealis* and limit its abundance are also a matter for conjecture. The species seems to be prolific in that a number of gravid females are seen each year, and SMALLEY has obtained as many as 90 eggs from one female. The females oviposit readily when subjected to direct hot rays of the sun or heat lamps. The larvae appear to be very tough, especially tolerant of moisture, relatively free of enemies. Although in captivity a lacewing larva devoured a *C. borealis* no evidence of any predation was observed in nature. It's foodplant is widely distributed and hardy. The severity of the winter did not seem to affect the larvae under observation in their natural habitat, and the winter was exceedingly harsh for this comparatively mild area. Perhaps one factor might be a narrowed tolerance for alternate freezing and thawing to which it would be exposed in more normal winters in this latitude.

SUMMARY

1. The activity of larvae of *C. borealis* appeared to be affected largely by temperature since their descent to the mulch and ascent to the foodplants generally correlated with rise and fall of temperature, although two individuals remained up on foodplants ten days longer than the others. Captive larvae hibernated five to six days later than natural larvae; and kept in an unheated but sheltered place, became active in spring about nine days earlier.

2. For temporary shelter and for hibernation *C. borealis* larvae descended to the underside of dead leaves on the ground from 4 inches to perhaps 3 feet, but definitely to as much as 24 inches, distant from its individual food plant. On occasion they may enter crevices in the earth to hibernate. They remained in place until early April when they began to move about, but evidence indicated that they did not become active enough to eat until May 5. The larvae were not gregarious.

3. In nature the larvae pupated on the underside of dead leaves laying down a mat of silk into which was fastened a cremaster and girdle of silk to hold them in place.

4. Careful inspection of their habitat gave every indication that larvae in nature invariably hibernate in the larval stage, probably in the sixth instar, never in the pupal nor adult stages.

5. Larvae raised in closed bottles or vials where temperature and humidity conditions remain almost constant usually developed into imagoes without hibernation. There was only one exception out of a total of 178 larvae which matured. Larvae raised in this manner developed much more rapidly, emerging the latter part of August and early September, whereas larvae raised in containers with open tops emerged the last of October and early November. Records also indicated that larvae raised in closed containers usually molted only six times prior to pupation (passed through only seven instars), while the others molted seven times (had eight instars).

6. The behavior of *C. borealis* throughout its life history was characterized by inactivity. Larvae responded to disturbance by elevating anterior and posterior extremities, a motion which was usually not violent enough to throw them off the surface on which they were resting; actually this response was relatively slow. Imagoes usually alighted and spread their wings on the upper surface of a roosting spot where they remained for long periods of time. However, at least fourteen instances were noted when imagoes were found on the underside of foliage. Females moved slowly and paused for long intervals when ovipositing in nature.

7. The habitat of *C. borealis* was rough hillside grown over with saplings and especially poison ivy and honeysuckle at a distance of 15 to 40 feet above the level of streams.

8. Captive larvae which hibernated closely approximated natural larvae throughout their life history.

9. Two larvae which were subjected to two days' torrential rain and which were under a submerged leaf, limp and apparently lifeless when found, revived and completed their development, demonstrating a high moisture toleration.

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University of Cincinnati, Cincinnati, Ohio U. S. A.

TWO NEW GENES, "WHITISH" AND "BLONDE", PRODUCING PALE MALES AND FEMALES OF *COLIAS PHILODICE*

by CHARLES L. REMINGTON

1. INTRODUCTION

Approximately sixty species of *Colias* are recognized, one or more in every major land-mass of the non-Antarctic world except Australia and the East Indies. It is probable that nearly all of these species have populations dimorphic for ground-color of the female, although the "alba" form may be very rare (Remington, 1954). This dimorphism is controlled by a pair of genes; the allele which produces the white form is dominant over the allele for the male-like yellow or orange form (Gerould, 1911, 1923). Collectors in North America are familiar with the abundant "alba" females of *Colias philodice* and *C. eurytheme,* as are European collectors with the white form of *C. croceus,* Japanese lepidopterists with the "alba" female of *C. erate poliographus,* and South Americans with *C. lesbia.*

Hopkins (1894) named the yellow pigment of *Colias* and other Pierididæ "Lepidotic acid" and identified the white pierid pigment as true uric acid. However, Wieland & Schöpf (1925, 1926) succeeded in crystallizing both of these substances and found that the white pigment (which they named "Leukopterin") differs from uric acid; they named the yellow pigment "Xanthopterin". It has been shown that leucopterin is merely oxygenated xanthopterin. Species characteristically white, such as various *Pieris,* were used in the earlier studies on leucopterin. It remained for Ford (1947) to show that the white pigment of female *Colias* is also leucopterin, as expected.

In the six species of *Colias* in which the heredity of this female dimorphism is known, the allele for white color is dominant over that for non-white. It seems likely that this will prove to be true for the other species and that these genes are homologous not only among the species of *Colias,* but in *Eurema, Phœbis,* and some other Pieridiæ.

There are, however, extremely rare males* of *Colias* which are more or less white. I have found references to rare white males of *C. aurorina heldreichi* Stgr. (Reichel, 1950), *C. croceus* Fourcroy (Warrier, 1951), *C. erate poliographus* Motsch. (Komai & Aé, 1953), *C. eurytheme* Bdv. (Hovanitz, 1944), *C. h. hyale* Linné (Metschl, 1922), *C. phicomone* Esper (Verity, 1911), and *C. philodice* Godart (Edwards, 1892; Gerould, 1911). Probably there are others. All of the cases listed above have been reviewed and discussed elsewhere (Remington, 1954).

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*Herrera (1952) has recently found for *Colias flaveola* Blanchard, of the Chilean Andes, that the males are nearly as white as the females. Previous investigators had mistaken males for females! Genetic and chemical studies of this unusual situation have not yet been reported.

2. White Male From Connecticut

It was of great interest to discover in August 1950 a very pale male among the F_2 of a wild yellow female *C. philodice* (Stock 58) taken in Woodbridge, Connecticut. This male proved to represent a distinctive hereditary form hereafter called "whitish". The wild female, her twenty-four sons and thirty-four daughters and her five F_2 granddaughters and ten F_2 grandsons (other than the lone "whitish" male) were all pure *philodice*-yellow. This line was one of more than one hundred reared in the course of a long investigation of the relationships of *C. philodice* to *C. eurytheme* and of the genetics of each species.

We immediately set out to pair the "whitish" male with one of his sisters, and on 7 August we confined him in a standard copulation cage in the sun for five hours, with no success. The next day the "whitish" male was placed in the sun with four sisters, three brothers, and four yellow females from other lines. To our delight, the "whitish" male paired after less than 25 minutes with one of the non-sib females and remained *in copulo* for over an hour. The following day the male was confined in the sun with two sisters, three brothers, and three non-sib females. In 8 minutes he had again paired, this time with a sister, and the copulation lasted nearly two hours. On 10 August the male was back in the copulation cage, with four females and two brothers, but no further mating took place. The male died shortly afterward. Three matings were obtained in this cage during the four days, and the only one in which the "whitish" male did not participate commenced after his removal *in copulo* on 8 August. There can be no doubt of the high reproductive viability of this individual, in contrast to that of some other white males recorded by earlier authors (*e.g.*, Komai & Aé, 1953; Hovanitz, 1944).

The first mating had been with a female F_1 of a wild "alba" female of *C. philodice* (Stock 62) from Woodbridge. The F_1 female having been yellow, she must of course have lacked entirely the "alba" allele of the mother; she had eight yellow sisters and eight white sisters. The mate of the "whitish" male laid many ova on potted *Trifolium repens* (White Clover), and from these we reared nine females and fourteen males, all with *philodice*-yellow ground-color. Since none of the twenty-three F_1 of the aberrant male showed the "whitish" character, it could be assumed with some confidence that the character was recessive to the normal type or that it was non-hereditary; lethality would not be expected, in view of the vigor of the known male.

These twenty-three F_1 emerged in September, a season when we had come to expect poor mating frequencies in our cages. On three successive days three to five males and five to eight females were placed in the mating cage in the sun for a total of over twelve hours, but no copulations were obtained. Following a full week of unsuitable weather, on 23 September we again tried five males and eight females, and this time no less than four pairs were found *in copulo* within an hour. Although each of the four females laid some ova, only nine F_2 of the "whitish" male were reared to emergence from the pupal shell, two males and one female from each of three females. One of these F_2 males was partly yellow but had portions of both pairs of wings whitish, with the white areas on the right and left wings symmetrical. His eight sibs were pure *philodice*-yellow. During parts of three days four males and one female F_2 of the "whitish" male were confined in

the mating cage; none copulated. Later (26 November) one of these males paired with a female of *C. philodice* from another Woodbridge line (Stock 70); from this mating one female and six males were reared, all normal *philodice*-yellow. One of these males copulated twice, with his lone sister on 21 January 1951 and earlier, on 13 January, with an "alba" female from still another Woodbridge line (Stock 75). This 75A female was remarkable in being the sister of a new type of pale male (see below for record of progeny). The 21 January mating produced nine "alba" females, 13 yellow females, and sixteen yellow males, none with the "whitish" character. The eight F_2 of this mating included two "alba" females, two yellow females, and four yellow males; again none were "whitish". None of these F_2 mated.

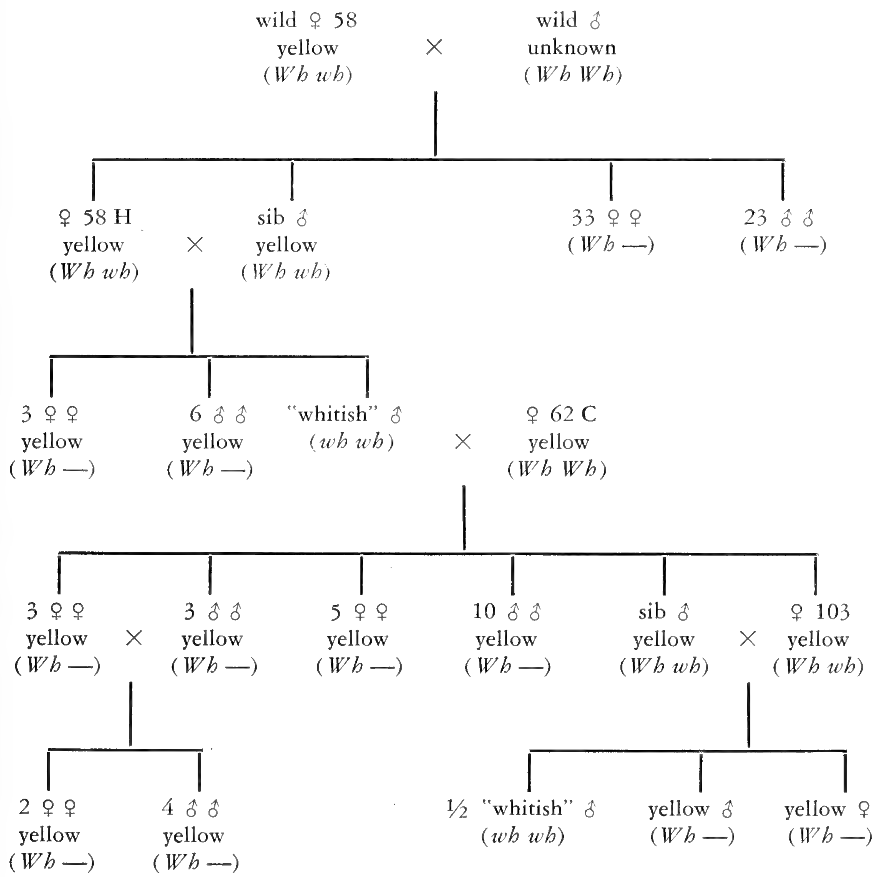

FIG. 1. GENEALOGY OF "WHITISH" LINE OF *COLIAS PHILODICE*

Distinctive characters of the two "whitish" males are contrasted as follows with the characters of two wild-type males selected as average; the color terminology is that of RIDGWAY's standard system (1912):

FULLY "WHITISH" MALE: Ground-color of upperside and underside Light Greenish Yellow; underside with hindwing and tip of forewing with sprinkling of dark scales; hindwing discal spot on upperside Pinkish Buff; hindwing discal spot on underside silvery, ringed with pale Prout's Brown; head with long, slender, erect hairscales of vertex mostly white; antennal shaft with scales faintly rosy, scales of club white; most wing-fringe scales lost.

The PARTLY "WHITISH" MALE F_2 of the above male did not expand well after eclosion, and part of the left hindwing was destroyed. The extensive pale areas stand out strongly from the adjacent yellow areas and on the upperside are as follows: left and right forewing whitish from slightly anterad of vein M_3 to vein 2A, except basal one-half of second cubital cell; left and right hindwing white from vein Cu_1 to anal margin (in wild-type the scales of the anal and second cubital cells are usually whitish). These "whitish" areas are also visible on the underside. The antennal scales are mostly rosy, but there is a sprinkling of white scales not seen on wild-type *C. philodice.* The erect hair-scales of the vertex and anterior notum are white, differing from the more or less bright rosy color of these scales in wild-type individuals.

YELLOW MALES: Ground-color of upperside Light Greenish Yellow to Pale Greenish Yellow; underside with hindwing and tip of forewing Wax Yellow, with sprinkling of dark scales; hindwing discal spot on upperside Capucin Yellow in center; hindwing discal spot on underside ringed with Ferruginous; head scales of vertex and antenna Spinel Pink; wing-fringes Spinel Pink.

If the partly white male is considered genetically the same as the fully "whitish" male, the probability is highest that the "whitish" condition is controlled by the recessive allele of a single gene. Somewhat less likely is the possibility that there are two pairs of genes, with double recessives in both necessary to produce "whitish" wings. The genealogy of this line is shown in Figure 1. The genetic notation *wh* is used for the recessive allele for "whitish".

3. Second Pale Form From Connecticut

A wild yellow *C. philodice* female (No. 75) from Woodbridge produced five daughters and one son. The male and one female are pale creamy yellow with the hindwing cell spot whitish. This is a new type, to which I will hereafter refer as "blonde", with the genic notation *bl* for the mutant allele. Three other sib females appear to show the usual "alba" allele for whiteness, and the remaining female is *philodice*-yellow. The "blonde" female and male did not mate. One of their "alba" sibs copulated with a male from the earlier "whitish" male stock (see above). From this female sixty-one F_1 were reared: fourteen "alba" females; twenty yellow females; and twenty-seven yellow males; none with an indication of "blonde". Fifteen brother-sister matings were obtained in early March, and offspring of nine females (two "alba") were reared to maturity, with the following totals recorded: one "blonde" female; eleven "alba" females; thirty-three yellow females; and forty-nine yellow males. The single "blonde" female was one of three offspring reared from one mother, the other two sibs (a male and a female) being *philodice*-yellow. Since neither parent showed the "blonde" character, it is reasonable to assume that the allele for "blondeness" is recessive to the wild-type and that the parents were heterozygous. The pedigree, with suspected genotypes, is shown in Figure 2.

The first "blonde" female and male may be distinguished readily from an "alba" female by the following characters (the last "blonde" female has been lost, so a detailed description is no longer possible, but close comparisons had shown her to be practically identical to the earlier "blonde" female):

"BLONDE" FEMALE: Ground-color of upperside Pale Chalcedony Yellow; underside with ground-color of hindwing and tip of forewing Cream-Buff, remainder of forewing nearly white; hindwing discal spot on upperside Pale Chalcedony Yellow; hindwing discal spot on underside silvery, ringed with Chatenay Pink; hindwing fringe on underside whitish Pale Vinaceous Lilac; forewing fringe darker; head with long, slender, erect hair-scales of vertex white; antennal shaft and tip with scales very faintly rosy.

"BLONDE" MALE: Ground-color of upperside Light Chalcedony Yellow; underside with ground-color of hindwing and tip of forewing pale Honey Yellow, remainder of forewing Light Chalcedony Yellow; hindwing discal spot on upperside white, standing out in contrast to ground-color; hindwing discal spot on underside silvery, ringed with Jasper Pink; hindwing fringe on underside Chatenay Pink; forewing fringe on underside Chatenay Pink; head with long, slender, erect hair-scales of vertex white; antennal shaft and tip with scales only slightly rosy.

"ALBA" FEMALE (selected as average): Ground-color of upperside white; underside with ground-color of hindwing and tip of forewing Cream Color or Naples Yellow, remainder of forewing white; hindwing discal spot on upperside Light Cadmium; hindwing discal spot on underside silvery, ringed with Ferruginous; hindwing fringe on underside Deep Vinaceous; forewing fringe on underside slightly darker; head with long, slender, erect hair-scales of vertex rosy; antennal shaft and tip with rosy scales.

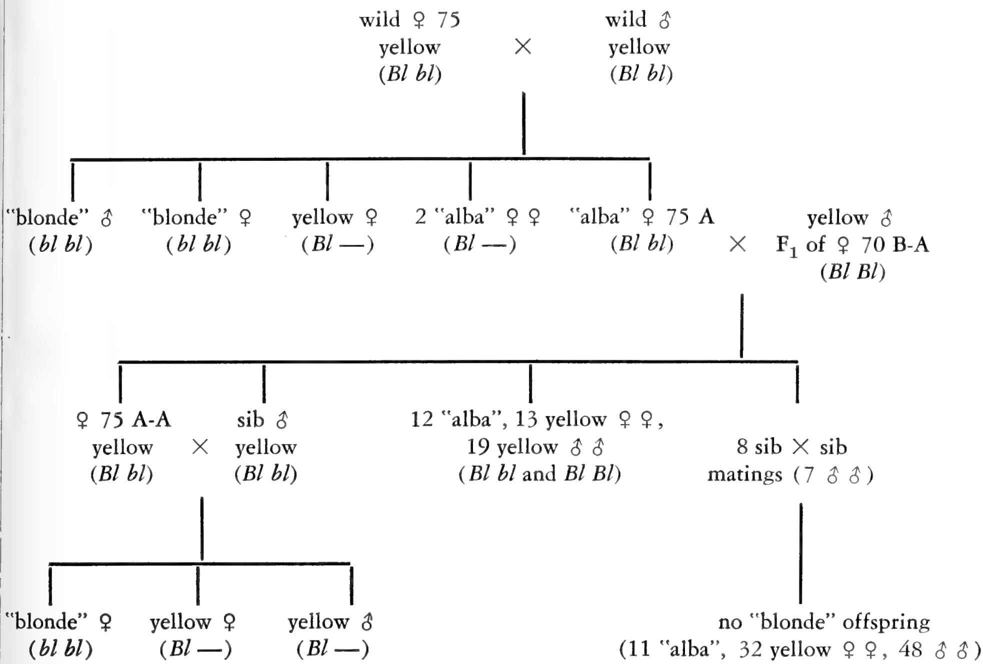

FIG. 2. GENEALOGY OF "BLONDE" LINE OF *COLIAS PHILODICE*

If, as is likely, ♀ 75A was heterozygous for "blonde" and her mate homozygous for wild-type, one in four of the mated pairs of their offspring would be expected to have both the male and female heterozygous. Further, 25% of the expected yield of each such cross would be "blonde", or one in sixteen of all the F_2 of ♀ 75A. Actually, only one in ninety-four was reared. Nothing is known regarding the effects of the "alba" gene in making the

"blonde" gene when an individual *Colias* has both, but it seems likely that "blonde" (as well as "whitish") is expressed in females only in the absence of "alba". If this is true, the eleven "alba" sibs of the "blonde" female are to be ignored in calculating the incidence of "blonde" in the brood of ninety-four, and the observed ratio becomes 1 : 82. The chi-squared test shows that such a deviation from a 1 : 15 ratio is to be expected in just over 5% of trials, and for the present the inheritance of the "blonde" gene can be considered unifactorial.

An attempt was made to find a relationship between scale morphology and ground-color. It was hoped that this might lead to a recognition of specimens heterozygous for the "blonde" gene (*Bl bl*) and perhaps permit separation of a female both "alba" and "blonde" (*A — bl bl*) in phenotype from one solely "alba" (*A — bl —*). The scales were classified according to the number of apical teeth; most specimens have scales with two, three, and four teeth. For uniformity the sample counts were made in the pale spots in the black margin of the forewing of females; four spots were sampled in each specimen: 1) between veins R_5 and M_1; 2) between M_1 and M_2; 3) between M_3 and Cu_1; 4) between Cu_1 and Cu_2. The great observed variability of proportions of the scale types does not seem to be correlated in any simple fashion with ground-color, but a much larger series might reveal some kind of regularity. It was found that the scale-type ratio did not vary significantly among the four spots on each wing; nor was the difference between left and right wings significant. The totals are shown in the following summary, with the notation for each specimen giving scales with two, three, and four points in sequence (*e.g.*, the "blonde" female showed 158 scales with two points, 487 with three points, 2 with four points):

"alba" (*C. philodice*) — 592-195-0; 286-206-0; 124-505-1; 89-293-226
"alba" (*C. eurytheme*) — 903-8-0; 443-386-0; 248-273-6
"blonde" (*C. philodice*) — 158-487-2
yellow (*C. philodice*) — 469-15-0; 364-51-0; 55-562-23; 79-808-92; 8-487-444
orange (*C. eurytheme*) — 385-162-1; 185-298-17.

4. Summary

a. The common *Colias* form with white ground-color is controlled by a dominant sex-limited gene (*i.e.*, carried by both sexes but expressed only in females). This "alba" female form is present in most species of *Colias* and in members of certain related genera. The pigment producing the "alba" coloration is leucopterin; other pterins are present in males and in non-"alba" females.

b. White or very pale ground-color occurs in males of *Colias*, but generally the white males are extremely rare in natural populations. This male dimorphism has been recorded for seven species of *Colias*. Two new cases in *C. philodice* are reported here for the first time. Both appeared in laboratory stocks reared from a single small population in Connecticut.

c. One white male was obtained by inbreeding the offspring of a wild fertile female. This male was outcrossed and its F_1 then inbred. The F_2 included a male with extensive white areas on the wings. This pale form is presumed to be under the control of a single recessive allele. The form is called "whitish" (*wh wh*). There is no reason to consider it a male sex-limited gene, although "whitish" females have not yet been found.

d. A second pale male was among the six F_1 of another wild female *C. philodice*. In this instance one of the female sibs was of the same pale shade, Light or Pale Chalcedony Yellow. The hindwing discal spot lacked completely the reddish or orange pigmentation of wild-type *C. philodice*. The form is called "blonde" (*bl bl*). One of the non-"blonde" sibs of the "blonde" male and female was outcrossed, and among the sixty-one F_2 was one "blonde" female. "Blonde" is probably inherited as a single recessive factor quite distinct from the gene for "whitish". It is not sex-limited. Phenotypically, the "blonde" form differs from the "whitish" form in having deeper, more yellow ground-color and no orange or red pigment in the hindwing discal spot.

e. No correlation was found between scale shape and the ground-color of "blonde", "alba", yellow, or orange females of *C. philodice* and *C. eurytheme*.

Roger W. Pease, Jr., assisted significantly in the difficult and time-consuming task of rearing the broods and obtaining the crucial pairings. It is a pleasure to express appreciation for his aid.

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Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

BUTTERFLIES AT WATER HOLES IN CENTRAL ARIZONA

by David L. Bauer

The habit of many species of butterflies to frequent water holes and moist ground has been observed and commented upon many times, and of a truth it is nothing out of the ordinary for it is wide spread and common. But one day while collecting at a water hole about two miles above the almost ghost town of Jerome, Arizona, I was amazed at the great numbers and wide variety of butterflies slaking their thirst at the water hole and flying about it.

As a result on June 28 and 29, 1951, I sat by the hole for several hours and jotted down the species as they came, netting those that needed closer observation for determination. At the end of my observations on the second day the list had reached the unusual number of forty distinct species that had come to get a drink. Below is a list of those that came during my three or four hours' observation on these two successive days last June.

Papilio philenor L.
" *multicaudata* Kirby
Colias eurytheme Bdv.
Eurema nicippe Cramer
Danaus plexippus L.
" *berenice* Cramer
Neonympha dorothea Nab.
Megisto rubricata Edw.
Melitaea fulvia Edw.
" *theona* Mén.
Phyciodes mylitta Edw.
Chlosyne lacinia Geyer
" *californica* Wright
Polygonia satyrus Edw.
Nymphalis antiopa L.
Vanessa atalanta L.
" *carye* Hbn.
" *cardui* L.
Limenitis wiedemeyerii Edw.
' *astyanax* Fabr.
Asterocampa celtis Bdv. & Lec.
Libytheana bachmanii Kirt.
Apodemia nais Edw.
Atlides halesus Cramer
Strymon melinus Hbn.
" *autolycus* Edw.
Leptotes marina Reak.
Hemiargus isola Reak.
Plebeius acmon West. & Hew.
Philotes enoptes Bdv.
Lycaenopsis pseudargiolus Bdv. & Lec.
Epargyreus clarus Cramer
Pyrgus communis Grote
Heliopetes ericetorum Bdv.
Pholisora mejicanus Reak.
Erynnis afranius Lint.
" *horatius* Scud. & Burg.
Copaeodes aurantiaca Hew.
Atrytone ruricola Bdv.
Atrytonopsis vierecki Skin.

Having observed that many species in two days I decided to go through my data book on spring collecting and see how many additional species visited the water hole that spring. Fourteen more species were there in the spring up to June 27th:

Papilio bairdii Edw.
Anthocaris sara Bdv.
Euchloe creusa Dbldy. & Hew.
Pieris sisymbrii Bdv.
" *protodice* Bvd. & Lec.
Agraulis vanillae L.
Melitaea gabbii Behr
Incisalia iroides Bdv.
Plebeius melissa Edw.
Zestusa dorus Edw.
Thorybes pylades Scud.
Erynnis juvenalis Fabr.
" *burgessi* Skin.
Megathymus yuccae Bdv. & Lec.

Then during the rest of the season I jotted down the additional species that were observed there from June 28 and 29 to the end of October, and another fifteen species were recorded:

Eurema mexicana Bvd.
Nathalis iole Bdv.
Minois meadii Edw.
Gyrocheilus patrobas Hew.
Euptoieta claudia Cramer
Melitaea dymas Edw.
Nymphalis californica Bvd.
Vanessa virginiensis Drury
Adelpha bredowii Geyer
Apodemia mormo F. & F.
Hypaurotis chrysalus Edw.
Brephidium exilis Bdv.
Hemiargus gyas Edw.
Hesperia woodgatei Wms.
Megathymus neumœgeni Edw.

This made a total of sixty-nine species of butterflies recorded from one series of water holes. This series of water holes is in the canyon above Jerome at about 5,300 ft. elevation and runs for about a mile parallel to the Highway 89 alternate. The best place to park the car for collecting there is at the water tanks, that can be seen from the road and where there is plenty of room for parking. I give this information because there might be some collector driving through that would like to stop.

The summer of 1951 was unusual in that the holes did not dry up during the entire summer; usually there is a time in the early summer, before the summer rains, when they are dry, and then there are practically no butterflies to be found.

Another observation made was that on hot days with low humidity such as was the case when the June observations were made there were many more butterflies at the holes. In the spring and fall months there were damp cool days when very few butterflies were found.

There is another water hole on the western side of the mountain, which is also along the Highway, where conditions are about the same as to elevation and great variety of species visiting the watering hole. At this hole additional species were taken as follows:

Mitoura spinetorum Hew.
" *siva* Edw.
Erora quaderna Hew.

No exact records were kept on this water hole on the western side, but from appearances there were considerably fewer species visiting it; however, some species were more abundant.

1103 Ballew Ave., Everett, Washington, U. S. A.

SEASON SUMMARY FOR 1953

Individual reports for the 1953 Lepidoptera season in North America should be sent to the Area Summarizers now. Advice for the preparation of these reports may be found in *The Lepidopterists' News,* vol.6: pp.89-91. The latest Season Summary, for 1952, was published in the last issue of the *News* (5 Nov. 1953). This should be used to develop comparisons for 1953 and for the names and addresses of the eight Area Summarizers.

C. L. Remington

A STANDARDIZED LABORATORY APPARATUS FOR USING THE SPEEDLIGHT IN PHOTOGRAPHY OF INSECTS AND OTHER SMALL OBJECTS*

by LELAND R. BROWN

Since a colored photograph offers a unique and rapid means of communication, many entomologists desire to use photographs of insects and insect damage in teaching, extension work and in publication. However, many of these entomologists are deterred from making such photographic records because of certain difficulties, such as the proficiency required, the time required and possibly the cost. One objective of this paper is to indicate how these items can be minimized.

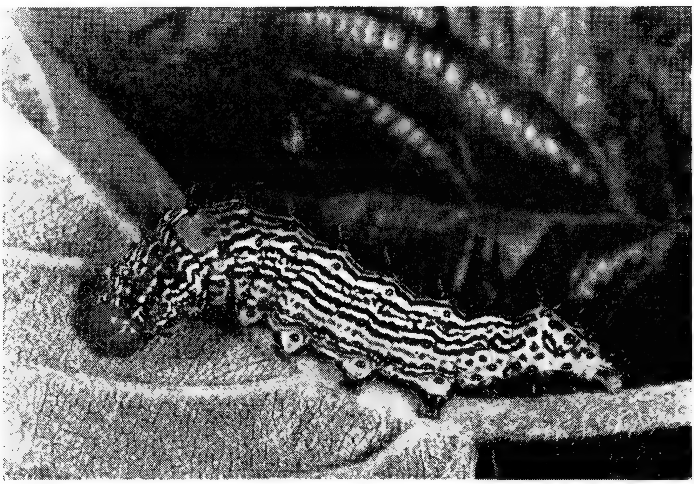

FIG. 1.
A living and moving larva of *Schizura concinna* (J.E. Smith) on Apple leaf. Photographed at 0.88× magnification on the original 35 mm. Kodachrome. Black-and-white reproduction cannot do justice to this beautifully marked insect.

A number of entomology departments or agricultural colleges employ a professional photographer, which is quite satisfactory on the whole and especially so if the photographic budget is large enough to allow such an expenditure. However, some departments cannot afford such an item in their budget and, more important, many entomologists, including the writer, want to have complete control over what appears on the film, and at the time needed, which can be suddenly and frequently. If such is the case, then the entomologist must obviously familiarize himself with the few facts and techniques necessary for

*Special funds were provided by the author's institution to help defray the costs of publication of this paper. —C.L.R.

this type of photography. The logic for this is the same as for any other technique of recording he may employ, such as the use of the pencil, typewriter, camera lucida, micro projector, and sound recorder. If the entomologist decides that photographic records are needed in his field, then it is helpful and sometimes necessary that he standardize his photographic technique so that these duties do not interfere unduly with his other responsibilities. Standardization not only enables the entomologist to make high quality photographic records quickly and at the time needed, but can also reduce costs of the photographic effort by saving time and film in making every exposure effective.

There is considerable literature on photomicrography, *i.e.,* photography with the compound microscope by transmitted light. Likewise the literature is quite extensive on conventional photography, *i.e.,* reflected light photography of objects at a distance from the camera of 2 feet to infinity. Also there is much fine equipment available for making photographs in these two categories. But relatively speaking there are very few authoritative articles on reflected and transmitted light photography between the two types, that is, in the range of low power photomicrography, or an arbitrary range of 0.1 to 20 linear magnifications. Likewise there are very few pieces of equipment with camera and lights as an integral unit for photography in this range of magnifications (see last section).

The main purpose of this paper is to summarize briefly from the great body of photographic literature those few facts, formulæ and techniques found useful to the writer in his insect photography and to describe an integrated photographic device, utilizing speedlights, as constructed and used by the writer. Not the least of the purposes of this paper is to stimulate manufacturers of photographic equipment to produce a simple but effective and integrated apparatus for the use of persons like the writer, who are not engineers or professional photographers, but who would like to obtain accurate photographic records quickly. Such a device need not be expensive or complicated, and this writer feels it would have a considerable market.

It seems logical to discuss first the component parts of this device and their calibration, and then the device as a whole and its operation.

THE CAMERA AND ITS ACCESSORIES

For low power photomicrography, a camera with a ground glass for focusing and composing is very desirable — indeed, it is a necessity at the higher magnifications of this range. For recording living and active insect specimens, a synchronized and automatic (in the sense of coupled film advance and shutter wind) ground glass camera of single lens reflex design is much superior to others. Because of the low cost of 35 mm. Kodachrome film (relative to larger sizes of color film) and other factors (see below), the writer chose the 35 mm. Exakta, (Exakta Camera Co., Distributors, 705 Bronx River Rd., Bronxville 8, N. Y.), a 35 mm. single lens reflex camera. This German-made camera has given excellent service. One feature of the 35 mm. Exakta that is disconcerting, until recognized and allowed for, is the fact that, in low power photomicrography (from approximately 2.0 X magnifications upward), about one-fifth of the ground glass image along the top edge is cut off. Possibly this is a result of the mirror being shortened to keep the camera compact. The writer does not know whether or not other cameras of this design have this fault. There are

other 35 mm. single lens reflex cameras available today, some less and some more expensive than the Exakta. These include: the Exa, Practica, Practiflex, Pentacon (or Contax S), (all made in Germany), Alpa (made in Switzerland), and Rectaflex (made in Italy). Brief descriptions, prices and photographs of these cameras can be found in the May 1953 issue of *Photography* magazine. The writer has had experience only with the Exakta, so is not competent to evaluate these other apparently fine precision cameras.

In order to use speedlight, of course, the camera shutter must be synchronized for that type of flash, *i.e.,* no-delay or "O" or "X" setting ("E" contacts in the Exakta V). All currently produced models of the cameras mentioned above are synchronized for speedlight, and all have interchangeable lenses. With lenses of shorter focal length than normal, it is desirable to have a clear spot and cross in the center of the ground glass. For a large number of photographs, the Penta Prism viewing device for the Exakta is a definite advantage.

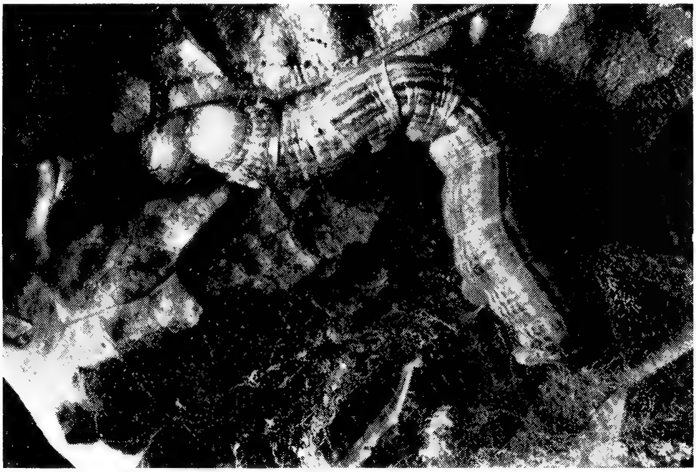

FIG. 2.

A living, moving mature larva of the geometrid, *Sabulodes caberata* Guenée, on a leaf of variegated ivy. Photographed at 0.59× magnification on the original 35 mm. Kodachrome with one speedlight lamp.

In order to obtain a larger image on the film one must either (1) use a lens of focal length longer than the normal lens, and keep the camera in the same position, or (2) extend the normal lens (or shorter focal length lens) from the film, and move the camera closer to the subject. The former case is needed infrequently in the laboratory (the formulæ stated in this paper apply in this case also, however). The latter case is more commonly used in low power photomicrography.

Extending the lens is accomplished by means of extension tubes or bellows extension attachments. Extension tubes have the advantages of being relatively inexpensive, sturdy, and, when combined properly, a given magnification can be duplicated with little difficulty. They have the disadvantage of taking some time to change to another magnification. A bellows extension is useful in that

Table 1. Adjustments for a standardized low power photomicrographic technique.*

1. Size of subject (cm.)	2. Magnification	3. Lens (focal length in cm.)	4. Marked f/no.	5. Portra lens	6. Extension tubes (length in cm.)	7. Lamp-to-subject distance (cm.)
76.2 x 50.8	0.05X	5(4')	8			R63
63.5 x 42	0.06X	5(3.25')	8			R62.5
50.8 x 33.8	0.07X	5(2.8')	8			R62
47.7 x 31.7	0.08X	5(2.6')	8			R61.5
38 x 25.4	0.10X	5(24")	8			R60.5
34.5 x 23.1	0.104X	5(20")	8			R60
31.7 x 21.1	0.11X	5(30')	11	+2		R44.1
29.2 x 19.6	0.12X	5(12')	11	+2		R44
25.7 x 17	0.14X	5(6')	11	+2		R43.9
23.6 x 15.8	0.15X	5(4.5')	11	+2		R43.8
21.6 x 14.5	0.17X	5(3.5')	11	+2		R43.7
19.1 x 12.7	0.19X	5(2.5')	11	+2		R43.6
16.5 x 10.9	0.22X	5(20")	11	+2		R43.5
12.4 x 8.3	0.29X	5	11		♀,♂	17.2
9 x 6	0.40X	5	11	+2	♀,♂	17.2
6.1 x 4.1	0.59X	5	11		♀,♂,1.5	14.0
4.1 x 2.7	0.88X	5	16		♀,♂,3	8.1
3.6 x 2.4	1.00X	5	16	+2	♀,♂,3	8.1
3 x 2	1.18X	5	16		♀,♂,1.5,3	7.0
2.54 x 1.69	1.42X	5(20")	16	+2	♀,♂,1.5,3	6.5
2.05 x 1.36	1.75X	3.5	8		♀,3	11.1
1.64 x 1.1	2.19X	3.5	8		♀,1.5,3	9.6
1.17 x 0.78	3.09X	3.5	8		♀,1.5,3,3	7.5
0.9 x 0.6	4.03X	3.5	8		♀,3,3,5	6.1
0.71 x 0.47	5.08X	3.5	8		♀,1.5,3,5,5	5.0
0.61 x 0.41	5.92X	3.5	8		♀,1.5,3,3,5,5	4.4
0.51 x 0.34	7.1X	1.5	5.6		♀,5	5.4
0.46 x 0.31	7.9X	1.5	5.6		♀,3,3	4.9
0.4 x 0.26	9.1X	1.5	5.6		♀,3,5	4.3
0.36 x 0.24	10.1X	1.5	5.6		♀,1.5,3,5	4.0
0.32 x 0.21	11.1X	1.5	5.6		♀,1.5,5,5	3.6
0.3 x 0.2	12.0X	1.5	5.6		♀,1.5,3,3,5	3.3
0.27 x 0.18	13.1X	1.5	5.6		♀,1.5,3,5,5	3.1
0.25 x 0.17	14.2X	1.5	5.6		♀,3,3,5,5	2.9
0.21 x 0.14	16.9X	1.5	5.6		♀,1.5,1.5,3,3,5,5	2.4

*Utilizing the following: 35 mm. daylight Kodachrome. Kine Exakta camera, model V, a 50 mm. f/3.5 Zeiss Tessar lens with focusing scale in feet (all settings at infinity unless otherwise specified); 35 mm. f/3.5 Fairchild type V lens; 15 mm. f/2.7 Zeiss Tessar lens; Kodak +2 Portra lens. Thriftlite speedlight, model AC-40, with an extension light, model EL-40, and an intensifier, model AD-15, on the powerpack. Each lamp at 45° from optical axis of camera, except at 25° for the range of magnifications of 0.05X to 0.104X ("R" indicates use of regular reflector). Male (♂) and female (♀) symbols refer to male and female adaptors for the extension tubes (♂ + ♀ = 1.5 cm., ♀ = 0.5 cm.).

changes of magnification can be made quite rapidly, but it has the disadvantages of higher cost and the possibility of slippage of the lens panel, unless one of highest quality is obtained. The bellows extension does not seem to be as sturdy as extension tubes. Also the bellows extension has a maximum and minimum limit to which it can be extended or retracted, whereas extension tubes can be added or deleted to the limit of practicality. However, with the proper lenses, the range of low power photomicrography can be covered with either method of extension. A disadvantage of some of the cheaper extension tubes is their less precise machining and the absence of sharp-edged baffle rings on their inner surface. In some cases thin rings of flat-black paper can be glued in these tubes to reduce light flare spots on the film. The bellows extension is free of this fault. Because of the initial cost the writer chose extension tubes.

According to authorities on lens construction (Greenleaf, 1950; Kingslake, 1939, 1951), lenses of decidedly asymmetrical construction (embraces many of the very fast lenses) should be avoided for low power photomicrography. Symmetrical or near symmetrical lenses are preferred, such as the Tessar types, the dialyte types (Dogmar, Unifocal, etc.), and the double anastigmats (Dagor, Protar, etc.). For the higher magnifications of this range, lenses of shorter focal length than the normal lens are useful in order to keep the lens extension within practical limits. Lenses designed for low power photomicrography are certainly to be preferred, good examples being the Micro Tessars of Bausch and Lomb, the Micro Luminars of Zeiss and the Micro Summars of Leitz. To date the writer has not been able to afford any of these lenses, so has had to be content with a 35 mm. and a 15 mm. focal length lenses, (see Table 1, column 3) from conventional movie cameras. Both of these lenses are mounted backwards in their mounts to improve resolution (see Figs. 6 and 7), *i.e.,* the normal film side of the lens toward the subject. On the whole, these used movie camera lenses are satisfactory, but lenses designed for the purpose would probably be better.

It will be noted in Table 1, column 5, that a 2-diopter positive supplementary lens is needed with the 35 mm. Exakta to bridge the gap between 0.1 and 0.3 magnifications and also in three other cases to obtain useful magnifications. The "2 in 1" Exakta adaptor extension ring can be used in place of the plus 2 diopter supplementary lens to cover the range of 0.1 X to 0.2 X magnifications.

In order to be certain of obtaining a given magnification it is most convenient to leave the lens-to-film distance fixed and focus by moving the camera and lens as a unit. Such an arrangement is a necessity for the higher magnifications of low power photomicrography. This usually involves some sort of rack and pinion arrangement for accurately controlled focussing. The writer has used a rack and pinion from a war-surplus microscope, which works very well (see Fig. 9). (It is well to note that by removing the optical parts of a dissecting microscope and replacing with the camera and extension tubes, a very fine, small, precision copying stand can be had.) There is a German rack and pinion now marketed for this purpose by Exakta under the trade name of "Novoflex" (code word CASTEL).

One reason was mentioned above for using the 35 mm. camera. Another reason should be discussed. An ever-present problem to contend with in low power photomicrography is the very shallow depth of field. Kingslake (1951) states: "For the same magnification on the film (not the same subject distance) and the same f/no., lenses of all focal lengths have the same depth of field."

This statement can be interpreted further. To fill the film area of a 35 mm. film obviously requires less magnification than to fill the film area of a larger size film. Or it can be said that less depth of field will be obtained with larger film sizes, if the full film area is utilized, and at the same relative apertures as compared to 35 mm. film. This is an obvious advantage of using this small film size.

Occasionally when extension tubes or bellows are purchased, a table of magnifications is also included. Such a table may not cover the complete range of magnifications desired, as when two or three sets of tubes are needed, or when shorter-than-normal focal length lenses are used. In this case a magnification is easily determined by observing on the long dimension of the ground glass the number of millimeters seen, on a meter stick focused upon, and dividing this number into the exact length (in millimeters) of the ground glass. With a ground glass camera this seems more simple than, and as accurate as, trying to determine the difficult-to-measure lens-to-film distance and using a more complicated formula to calculate magnification. Before determining the magnifications it is helpful to list all possible combinations of extension tubes and lenses. After determining the magnifications with these various combinations, the most useful magnifications can be arranged as in columns 2 and 6 of Table 1. At the same time the magnifications are determined, it is convenient to note the length and width of the field covered at a given magnification, as this will save time in the daily routine of photographic recording (see Table 1, column 1).

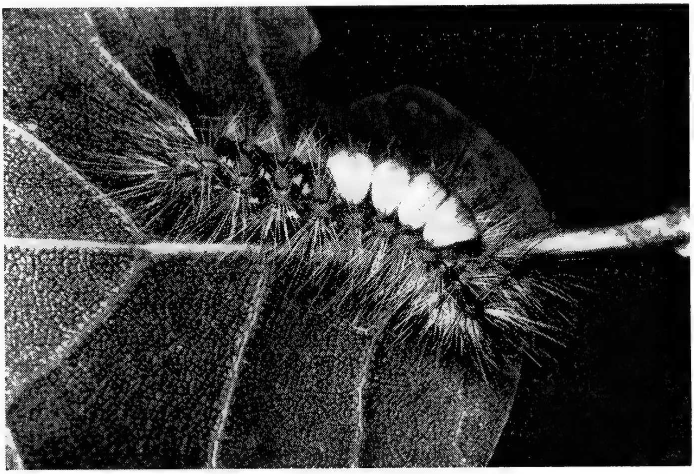

FIG. 3.

A living and moving larva of the Tussock Moth, *Hemerocampa vetusta* (Bdv.), on a leaf of Coast Live Oak. Photographed at 1.00 magnification on the original 35 mm. Kodachrome.

It was necessary to compromise on a given marked f/number, or relative aperture, for each magnification to make the photographic effort more rapid. The objective was to obtain as much depth of field as possible without having a noticeable loss of resolution in the plane focused upon from the effects of diffraction (scattering of light around the edges of the iris blades). At a given magnification (and at all magnifications listed in column 2, Table 1) the proper aperture was determined by stopping down a given lens to the f/no. at which

the image just began to show a very slight unsharpness. This was simple to do by observing, on the clear spot of the ground glass, the image of a brightly illuminated object, such as a white celluloid ruler with much fine detail. These marked apertures are indicated in Table 1, column 4. These correspond to effective apertures of f/8.4 to f/100.4. Effective f/no. equals the magnification plus one, multiplied by the marked f/no., as for example at 1.18 X with a marked f/no. of 16, effective f/no. $= (1.18 + 1)(16) = 34.9$. It is interesting to note that the effective aperture is not changed when a Portra lens is used (Kingslake, 1951).

It will be noted in the range of magnifications from 0.05 X to 0.59 X (see column 4 of Table 1) that these apertures are not as small as indicated in the foregoing. In these cases it was necessary to open the lens aperture somewhat so the speedlight lamps could be placed further from the subject to achieve more even illumination (see the next section). Even at the indicated distances, only two lamps are not ideally suited for even illumination at the lower magnifications (0.05 X to 0.1 X). Raising the lamps to 25° from the optical axis helps somewhat.

LIGHTING EQUIPMENT

Proper illumination in low power photomicrography is just as important in making the photograph as the camera itself, but this is the phase most often neglected in papers on this branch of photography. This section is concerned with a new type of lighting and its adjustment for low power photomicrography, especially reflected light (as contrasted to transmitted light).

The invention and development of the speedlight has been traced in several publications, one of the most appropriate being that of Van Riper, *et al* (1952). Most of the currently made speedlights are listed by Lipton (1953), who also gives an excellent account of this type of lighting. *Photography* for May 1953 lists most of the speedlights available in the United States and has photographs of many of them. The speedlight is also known as high-speed flash, electronic flash, and strobelight. The light produced by one of these units is characterized by being a cool, very brilliant flash of very brief duration, and having a color range somewhat comparable to average daylight.

As compared to usual sources of illumination, the advantages of the speedlight for use in low power photomicrography, particularly of insects, can be listed as: (a) elimination of the effects of whatever vibration may be present in the photographic set-up; (b) elimination of the effects of movement of the living specimen; (c) elimination of prolonged exposures; (d) when desirable, elimination of killing, deep anesthesia or cooling of the specimen; and (e) elimination of hot sources of illumination. In regard to point (d) it should be mentioned that if the specimen is so active that it will not remain in the photographic field, slight anesthesia with carbon dioxide or chloroform is necessary.

With conventional sources of artificial illumination (incandescent or combustible sources such as photoflood or flash bulbs), the photographer has three variables he can control readily: lamp-to-subject distance, f/no., and shutter speed. However, with a speedlight the effective exposure time is so brief (1/500 to 1/50,000 of a second for most units) that shutter speed has no effect on the exposure. This leaves the photographer with only two variables he can

control: lamp-to-subject distance and f/no. With the 35 mm. Exakta camera used by the writer (model V), the shutter speed is set at 1/50 of a second and left there when using the speedlight; at this shutter speed the complete film area is said to be open for 6 milliseconds by the focal plane shutter (Berkowitz, 1951). At faster shutter speeds with this camera the film area is never completely open, so the speedlight cannot be used with these faster shutter speeds. This is generally true of all 35 mm. cameras with focal plane shutters.

The Kelvin rating of most speedlights is listed as 6000° to 7500° or even 8000°, depending upon the unit. The lower Kelvin rating of certain speedlights, such as the "Thriftlite" (Pho-Tak Corporation, 15-21 N. Loomis Street, Chicago 7, Illinois) allows daylight Kodachrome to be used without filters. Higher Kelvin ratings of some speedlights require slight compensating filters, either on the camera lens or on the lights.

The principal disadvantage of the speedlight is its relatively high initial cost. For low power photomicrography, however, low power speedlights, and consequently lower cost units, are sufficient. It should be noted also that low power speedlight units are produced currently that are less expensive than several conventional microscope illuminators.

The manufacturer usually supplies a "guide number" for various types of artificial photographic illumination, including the speedlight, of course. A guide number is a very simple but extremely useful application of the inverse square law of illumination to allow the photographer to obtain a correctly exposed film. With a given film and shutter setting, the photographer divides the guide number by the lamp-to-subject distance to obtain the correct lens aperture (f/no.). Or, if a given f/no. is decided upon, the guide number is divided by the f/no. to obtain the correct lamp-to-subject distance. In low power photomicrography the formula should be modified to: lamp-to-subject distance equals the guide number (for centimeters) divided by the effective f/no.

For conventional photography it is sometimes necessary to check the guide number of the speedlight as stated by the manufacturer. In low power photomicrography the guide number should certainly be checked or determined, as the speedlight may frequently be used in a manner different than as originally purchased. The guide number supplied by the manufacturer is usually supplied for use in feet. For low power photomicrography this should be changed for use in centimeters. For example, suppose the manufacturer's guide number is 35 for use with feet (this is the manufacturer's guide number of the "Thriftlite" model AC-40 with Intensifier, with a single lamp and reflector and for Kodachrome daylight film; when converted for use in centimeters, it is essentially the same as the writer's determination of 1070; the guide number of the single lamp, with the intensifier and without the reflector, was determined to be 305 for use in centimeters). Multiply 35 by 30.48 (*i.e.,* the number of centimeters per foot) to obtain a guide number approximately 1067. The reason for this is that in low power photomicrography the speedlight lamp may be as close as 2 or 3 centimeters from the subject, and it is simpler to measure these distances in the metric system than in fractions of a foot or an inch.

To determine a guide number the writer has found it convenient to photograph a gray scale at various marked f/no.'s and keep the following factors

constant: film, magnification, shutter speed, and lamp-to-gray-scale distance. When the film is returned from the processor, the various exposures are projected to the original dimensions of the gray scale, and the gray scale is compared, side by side, with its image. Then the guide number is determined practically by inspection.

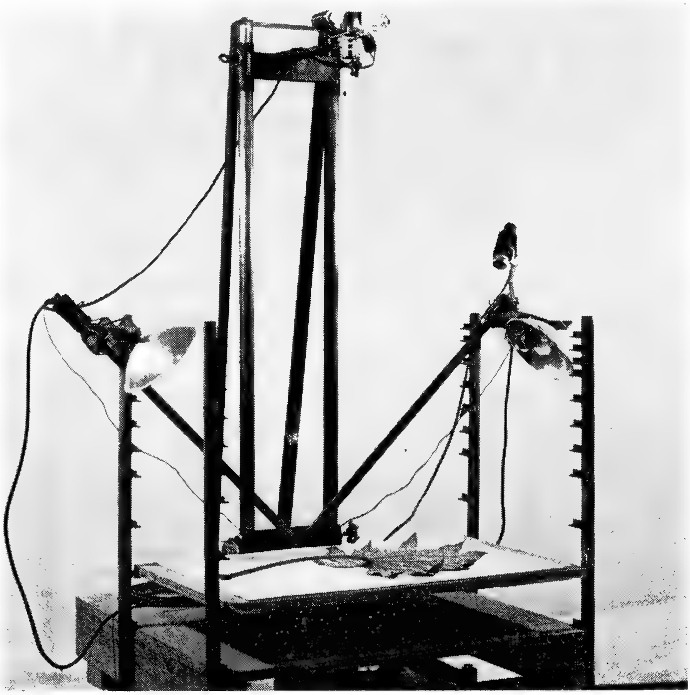

FIG. 4.
Photographic recording stand set up for 0.05× magnification; see Table.

For clarity this is best illustrated by an example (see Fig. 8). The problem was to determine the guide number of the Thriftlite, model AC-40 (with the intensifier on the power pack) and an extension light, model EL-40 (*i.e.,* the use of two lamps), with type A Kodachrome, with the type A filter for daylight. The camera was a Kine Exakta, model V, with the shutter set at 1/50 second and the synchronizer cord in the contacts for speedlight (*i.e.,* "E"). The camera lens was located at 20 inches (*i.e.,* magnification of 0.104 X) from the center of the gray scale with the long dimension of the gray scale and the camera set parallel to the speedlight lamps. Each lamp, in its regular reflector, was located 60 cm. from the center of the gray scale and on each side of the camera at 45 degrees from the optical axis of the camera lens. Six exposures were made under these conditions at the following relative apertures (f/no.'s): 4, 5.6, 8, 11, 16 and 22.

When the film was returned from the processing laboratory, each transparency was projected on a white matte surfaced screen to the original dimen-

sions of the gray scale, that is, about 10 times magnification of the transparency. By holding the gray scale next to its projected image, and in a clear portion of the projected beam of light, it was obvious that the exposure at f/4 was overexposed and those at f/16 and f/22 were progessively underexposed. By closely inspecting the white end and first stage of gray of the f/5.6 exposure, both steps appeared white so the transparency was said to be overexposed. Likewise with the f/11 exposure the black end and first step of dark gray were indistinguishable, that is, both black, so this transparency was said to be underexposed. The image of the exposure at f/8 was almost identical with the gray scale, that is, all steps of the gray scale were distinct.

The effective aperture at 0.104 magnification and a marked aperture of f/8 is equal to 8.83. Thus the guide number for these conditions is (8.83) (60 cm.) or approximately 530. In Table 1, 530 is divided by each effective aperture in the range of 0.05 to 0.22 magnifications, inclusive, to obtain the lamp-to-subject distances in column 7. "R" indicates the use of the reflectors on the lamps.

Similarly and as shown in Fig. 9, a guide number of the bare lamps (without reflectors) was determined to be about 244. In Table 1, 244 is divided by each effective aperture in the range of 0.29 to 16.9 magnifications, inclusive, to obtain the lamp-to-subject distance in column 7.

As can be seen in Fig. 6, there is one-half of a frozen juice can over each lamp. The inside of each half-can is lined with shiny-surfaced aluminum foil. The use of this small reflector gives no increase in guide number over the bare lamps, contrary to what one would expect; that is, the guide number of the two lamps with the juice can reflectors is 244. The principle function of the cans then is to protect the lamps from falling objects.

There is a factor which must be recognized when working with some speedlights at very close subject distances, and that is the guide number becomes less as the subject is approached by the lamp in the reflector as supplied by the manufacturer. Quite possibly this is because the reflector is not designed for work at such close distances. If the speedlight is one in which the reflector can be detached, such as the "Thriftlite" and certain others, then the apparent radiating source more closely approaches that of a point source of illumination, upon which the inverse square law of illumination is based. If a guide number is determined for the lamp without the reflector, that guide number can be used accurately (on or near the optical axis of the camera) whether the lamp is 1 inch or 50 inches from the subject. However, in order to obtain more even illumination of larger subjects, it is practical to use the lamp with the reflector up to about 0.3 magnification, and from that to about 17 magnifications, using the bare lamp (or in its juice can protector).

This phenomenon of decreasing guide number, as the lamp in its regular reflector is brought nearer the subject, has been demonstrated several times by the writer with the Thriftlite, and he is satisfied that it is not due to variation in film processing or other variable. The reader should not construe this to mean that the speedlight with a non-detachable reflector cannot be used for low power photomicography. It is probable that any speedlight can be used in this type of photography, particularly at the lower magnifications. But with those speedlights having fixed reflectors, a guide number should be determined for each magnification contemplated, which amounts to the same thing as trial

exposures. With a bare lamp this is not necessary. Unless one has a relatively powerful speedlight, it is not possible, at the higher magnifications, to get the lamp in its regular reflector close enough to the subject because of interference of the camera and extension tubes with the reflector.

Since by its nature the speedlight is not a continuous source of illumination (as compared to photoflood, for example), some means must be provided for light for focusing and composing the picture. For this a conventional microscope illuminator (Spencer No. 353 in Figs. 5 and 9) can be used, and this is left on during the preliminary and taking phases of the picture. The relatively dull light of this microscope illuminator (compared to the brilliant speedlight flash) offers sufficient light for focusing and composing but only 1/10 to 1/20 the amount of light (even at its brightest) necessary for recording the image on the film. With color film this gives no practical exposure whatever, and one need not fear ghost images appearing on the film.

THE PHOTOGRAPHIC STAND

The photographic stand is shown in Figs. 4 through 9, with the camera, speedlight, and lamps attached. The stand itself is like many other photographic copying stands noted in the literature, but has a few refinements to adapt it more conveniently to a standardized technique.

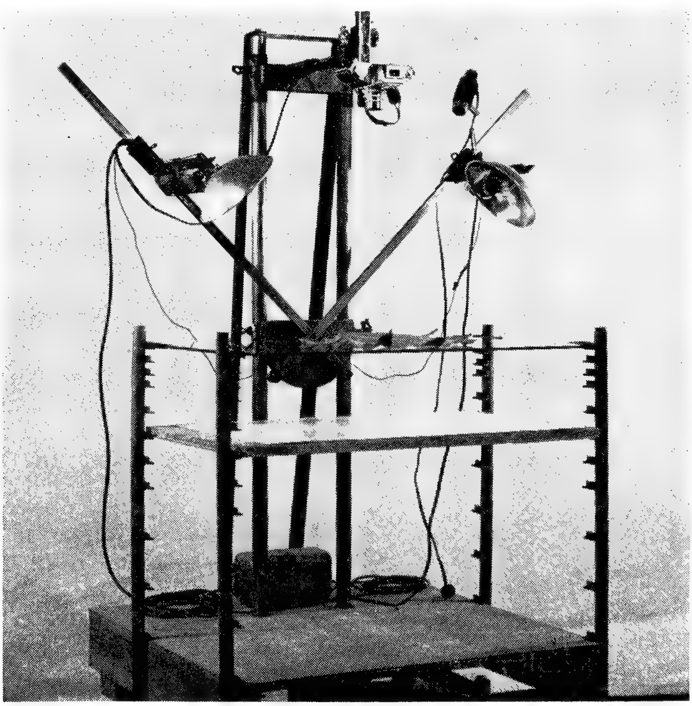

FIG. 5.
Photographic recording stand set up for 0.11× magnification with leaf subject on plate glass; see Table.

A piece of war-surplus equipment was found which had a cast-iron base with two hollow vertical steel pillars attached. The pillars are 4 feet long. A piece of ¾-inch thick 5-ply plyboard, 32 inches square, was fitted over the cast-iron base and attached to it, utilizing various pieces of wood and bolts. This arrangement left a space at the front approximately 20 by 30 inches, which is the maximum size this device can record. The 10 by 30 inch space behind is used for holding the speedlight powerpack and coiled cables. A rubber-tired caster is attached to each corner so the apparatus can be moved about.

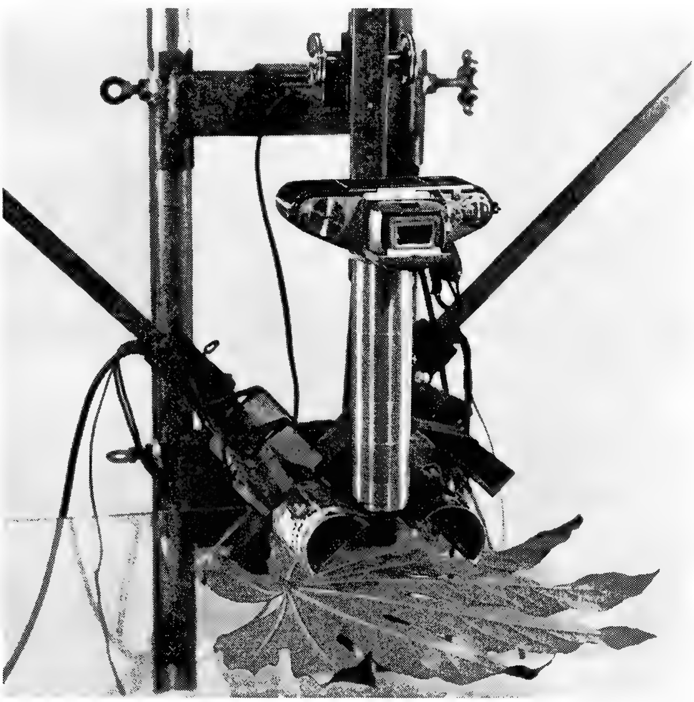

FIG. 6.
Photographic recording stand set up for 5.92× magnification; see Table. Note use of juice-can projectors on lamps.

The pillars are joined together at the top with a piece of strap iron. Extending down to the rear from the tops of the pillars are two pieces of angle iron which fasten through the plyboard and cast-iron base. Thus the pillars are very rigid and there is little or no angular movement possible between the pillars and baseboard. On each pillar there is a pair of close-fitting iron sleeves, which have set screws. The top sleeves are joined together by welding two pieces of cold rolled steel on the front and back. A piece of cold rolled steel is welded to this and extends out over the center of the baseboard to hold the camera and its accessory rack and pinion. This top member is for the rough and fine positioning of the camera.

The bottom sleeves are joined together in a similar manner. Welded to this bottom member is a semi-circular steel plate with the curved portion down; the curved portion is graduated in 5° increments. A bolt is located in the center of the semi-circle to act as a pivot for two steel bars, which are of rectangular cross section, and are approximately 3 feet long. Each bar extends slightly beyond the edge of the semi-circle with an arrangement for quickly clamping each bar at any angle from the optical axis of the camera. After the necessary guide number tests were made it was realized that, with a standardized apparatus, this complete adjustability of the angle of lighting is unnecessary. The most useful setting is with each lamp at 45° from the optical axis. Each lamp at 25° gives better illumination at the lower magnifications.

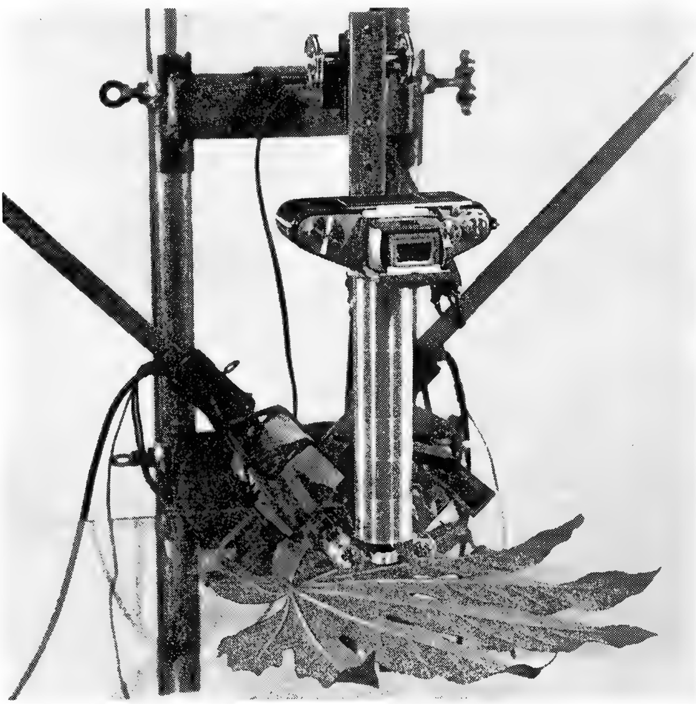

FIG. 7.
Photographic recording stand set up for 16.9× magnification; see Table. Note bare lamps.

Each bar is graduated in millimeters for 15 millimeters from the center of the pivot bolt and in 5-millimeter increments thereafter to the end of the bar. To each bar a closely fitted sliding member is attached, with a set screw for positioning at any distance from the pivot bolt. The reason for using a bar of rectangular cross section is that no rotation of the sliding member is possible, *i.e.,* motion is possible only along the bar. Each sliding member is constructed of pieces of flat and square steel stock, the latter of the same thickness as the bar, welded at the edges. To each sliding member a piece of angle iron is welded to extend out over the base board for holding a lamp of the speedlight.

The center of each lamp is located in the same plane as the optical axis of the camera lens.

At each corner of the 20 by 30 inch front space a vertical pipe 2 feet long is bolted to the wooden frame. At appropriate intervals along each pipe short sections of small angle iron are welded. The equal height of each angle iron on each pipe can be assured by laying the four pipes together on the welding bench and laying a piece of angle iron perpendicularly across the tops of the pipes and spot welding each pipe to the angle iron. The angle iron is then cut between the pipes to obtain the four pipes with equal spaces. These angle iron spacers are for the purpose of holding a 20 by 30 inch piece of plate glass with ground and polished edges, and a piece of ¾-inch 5-ply plyboard of similar dimensions. The plate glass is used for supporting the specimen at the higher magnifications while the background is supported on the movable plyboard beneath.

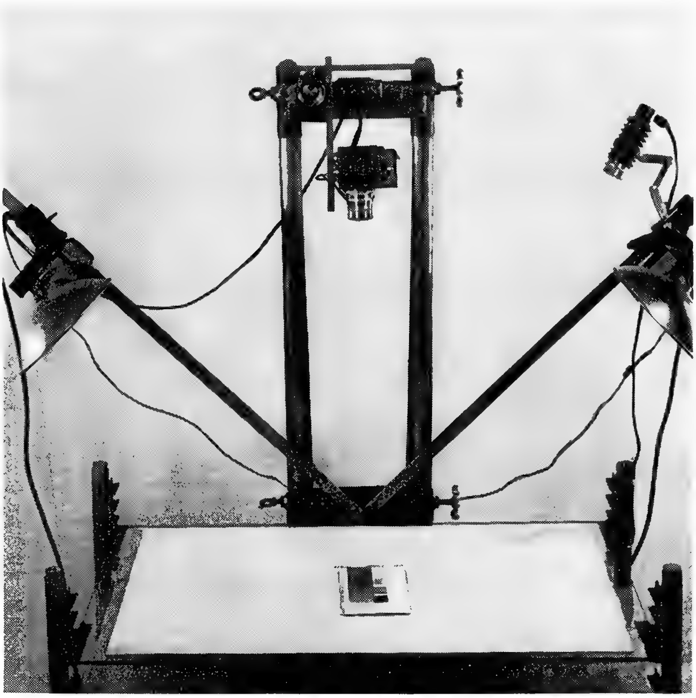

FIG. 8.

Set-up for photographing gray scale and color patches for guide number determination of speedlight with regular reflectors on lamps; see text.

It was learned to the dismay of the writer that any machine work or grinding necessary should be done after the pieces are welded together, as the welding process tends to deform the metal somewhat. This applies to the sliding sleeves on the vertical pillars and the sliding members on the steel bars. If these parts are a close fit before welding, they are almost certain to

bind after welding, necessitating some laborious grinding to obtain freedom of movement.

A variety of backgrounds may be used. The specimen can be placed directly on black paper or cloth and this is often very pleasing. The specimen can be placed on the plate glass with a "physicist's black body" beneath for an absolutely black background (Pence, 1947). The black body in this case is a box, painted flat black, both inside and out, and with a hole in one side slightly larger than the area to be recorded. This amounts to photographing with a shadow for a background, that is, an absence of light in the background. In this case care must be exercised to keep the plate glass clean, as a particle of dust or the scale of a moth wing can be quite distracting. Also shiny surfaces on the camera front should be painted a flat black, as light can strike these surfaces, reflect to the plate glass and back into the camera, causing an out-of-focus light spot on the black background. Also the writer remembers

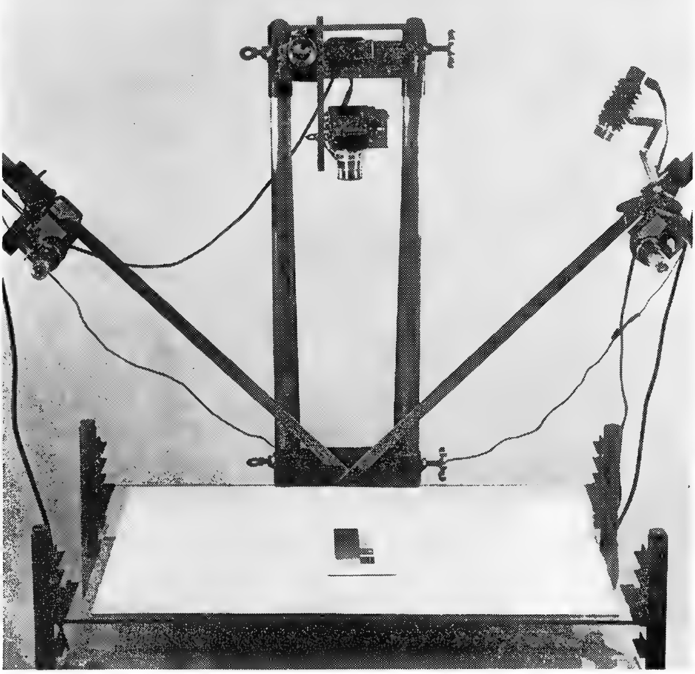

FIG. 9.
Set-up for photographing gray scale and color patches for guide number determination of speedlight with bare lamps; see text.

one disconcerting series of pictures with the black body in which a dim image of a red-checked shirt he was wearing appeared as a reflection in the background. Oftentimes these disadvantages can be overcome by dispensing with the plate glass and suspending the subject over the hole of the black body with a clamp or some such device.

Light backgrounds are desirable for many subjects. These are possible by placing the subject on the plate glass and white or colored blotters on the plyboard substage. Shadows of the subject can be cast outside of the picture area by lowering the background to the proper level. This level could be indicated in another column in the photographic chart (*i.e.,* in Table 1). It will be noted in Figs. 5 and 6 that the long dimension of the camera is placed parallel to the speedlight lamp. With this arrangement the shadows are cast out of the background with the background nearer the subject than when the long dimension of the camera (and picture area for 35 mm. film) is perpendicular to the lamp. This results in a brighter background. Note the use of the Penta Prism viewfinder in Figs. 5 and 6. In this position this viewfinder is much more convenient than the regular hooded finder.

Of course there are other means for obtaining a light, shadowless background, but other methods make the apparatus more complex. However, many entomologists would consider this additional control desirable. In such cases a single speedlight capable of operating possibly four lamps, two for illuminating the subject and two for the background, would be desirable. The background could be an opaque matte surface illuminated from above or a ground or opal glass illuminated from below.

Many times the whole picture area includes a leaf or portion of a leaf or twig. In these cases the leaf can be pinned or taped flat to a pinning block, and the choice of a background is not a problem.

MAKING THE PHOTOGRAPHIC RECORD

It saves time to make a rapid measurement of the length and width of the specimen or area to be included in the photograph. An estimate often suffices. Such a measurement gives the clue to all other operations to be performed to obtain the photograph (see column 1 of Table 1). With a standardized technique all that need be recorded on the record file cards or notes regarding the photographic technique is the magnification used.

The type of background is decided upon and adjusted. The specimen, or the area where the specimen will be, is placed temporarily near the back of the stage, and the center of the pivot bolt of the speedlight arms is brought to the same level. The lights are adjusted to the proper distance, as measured on the calibrated arms, and the reflectors are left on or removed as required. These directions from the photographic chart having been followed, the lighting equipment is now adjusted to give proper illumination at the desired magnification.

The focusing light is turned on, and the speedlight is allowed to develop a full charge with the synchronizer cord attached to the camera. The proper extension tubes and lenses are attached to the camera, shutter speed is set at 1/50 second, and with the lens at full aperture the subject is brought into rough focus by moving the member supporting the camera. The subject is composed on the ground glass and fine focus attained with the rack and pinion. The lens is adjusted to the proper f/no., and the picture is taken with the cable release. So adjusted, picture after picture of the subject can be taken, and they will all be of the same high quality as long as enough time is allowed for the condensers of the speedlight powerpack to develop a full charge (10 seconds between flashes with the "Thriftlite").

Such is the case with immobile or fairly placid insect subjects. With actively moving subjects slightly different techniques may be necessary, some of which involve a high degree of patience and manual dexterity. All adjustments can be made before the subject is placed under the lens, even to stopping down the lens. An adult insect that may fly can be placed on a supplementary piece of glass and beneath an inverted half of a petri dish. When the subject appears in suitable position by adjusting the piece of glass, the petri dish is carefully removed, slight adjustment made in the rack and pinion focusing, and the cable release pressed. With certain larvæ, such as tortricid larvæ, it is sometimes expedient to dissect the rolled leaf "nest" beneath the camera lens with all in readiness to photograph the larva when exposed. Another possibility, such as with certain tree-hoppers or leaf-hoppers that like to scurry to the lower surface, is to have the lens prefocused on the same horizontal plane as the pivot bolt of the speedlight arms. The plate glass stage is removed 2 or 3 inches below to act as a hand rest, and the host plant with the moving insect subject is manipulated into the field with one hand and the cable release operated with the other hand.

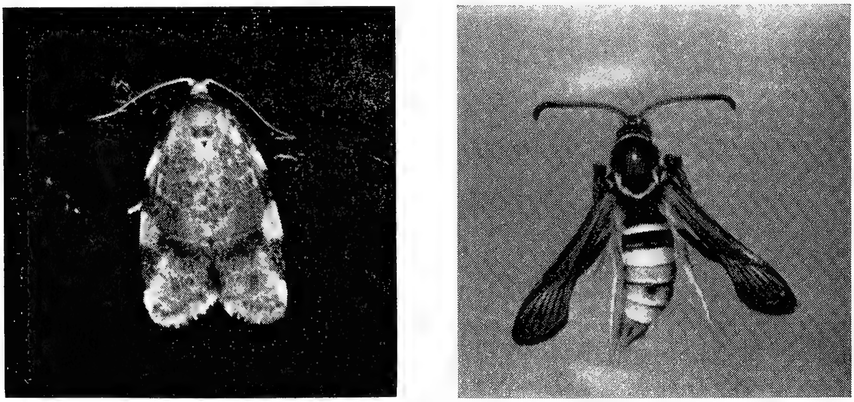

FIG. 10.

Left, a living, resting adult of the Fruit Tree Leafroller, *Archips argyrospila* Walker; reared from Coast Live Oak. Photographed at 1.18× magnification on the original 35 mm. Kodachrome. Illustrates the difficulty of keeping the plate glass stage clean when using the "black body" for a background. Right, a living and moving adult of the Hornet Moth, *Alcathœ apiformis* (Clerck); reared from Willow. Photographed at 2.88× magnification on the original 35 mm. Kodachrome.

As mentioned previously, it is sometimes necessary to inactivate the very active insects with carbon dioxide gas or chloroform if they cannot be induced to remain in the photographic field. Chloroform acts very quickly, but the writer prefers carbon dioxide, since it does not have the apparent ill effects on the insect specimen. It seems best to wait a few moments after removal from the carbon dioxide atmosphere so the insect can assume its most alert attitude prior to scurrying off again.

As would be expected such a standardized photographic device would have uses in addition to photographing insects. One use the writer has made of this device is the rapid microfilming of literature not always readily available, such as copying abstracts from various journals, entomological keys, etc.

In teaching, wall charts are useful but for newer fields these are not always available. In such cases drawings from various entomological texts often suffice. The writer had occasion to make 250 transparencies of textbook drawings on this photographic device to use as visual aids for his class.

The writer has made not less than 1000 Kodachrome transparencies on this photographic device by the technique outlined. The percentage of those improperly exposed was very low. In those cases of improper exposure the trouble was not with the device but almost exclusively with the writer, as for example: forgetting to set the f/no., failing to adjust the lamp-to-subject distance, failing to let the powerpack develop a full charge, etc. Thus it can be said, almost categorically, that by following rigidly such a technique of "cookbook photography" one can expect properly exposed low power photomicrographs every time the shutter is released.

INTEGRATED PHOTOGRAPHIC UNITS AVAILABLE COMMERCIALLY

Earlier it was mentioned that very few integrated photographic units were available for use in low power photomicrography. The writer knows of only two such units utilizing the speedlight. Apparently neither of these is particularly well adapted to making photographic records at magnifications greater than about 1.0 X. However it should be mentioned, at least in the writer's work, that a large percentage of photographs have been taken at 1.0 X magnification or less; that is, either of these units might be quite suitable for many entomologists. The writer has handled only one of these units, the "Photronic", and has seen only a brochure of the other. Both units appear well designed for clinical photography in hospitals. Both have built-in focusing lights, and both utilize 110 volt alternating current. Either unit can be attached to a tripod and aimed in any direction, such a feature being very desirable and a considerable advantage over the device described by the writer.

The "Photronic" (Photronic, Inc., 5662 S. E. 122nd Ave., Portland 66, Oregon) utilizes a speedlight with a circular flash tube fixed around the front of the lens of the 35 mm. Exakta or other 35 mm. single lens reflex camera. As one focuses on the ground glass a dial indicates automatically the proper f/no. The lens aperture is set by hand and the picture taken. Such an arrangement of the speedlight lamp gives a flat type of lighting, with little or no shadow around the edges of the subject, which is very effective on Kodachrome. This unit is well adapted for photographing into cavities.

The "Quick-clix" (Walden Industries, Inc., 350 W. 50th Street, New York 19, N. Y.) model A-300, utilizes what appear to be two conventional speedlight lamps and reflectors, fixed approximately 5 inches on each side of the camera lens. The camera can be, apparently, any 35 mm. single lens reflex camera or other type of camera. The "Quick-clix" does not have the automatic feature of the "Photronic" in which the light-to-subject distance is related to relative aperture. However, the "Quick-clix" does have an arrangement for pre-setting of the lens aperture whereby focusing is done on the ground glass with the lens at maximum aperture. As the shutter release is actuated, the aperture automatically stops down to the pre-set aperture.

A unit in which the good features of the "Photronic" and "Quick-clix" were combined would be a truly automatic recording device for the magnifications for which these units are designed.

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Dept. of Entomology, University of California, Los Angeles 24, Calif., U. S. A.

PERSONALIA

The death of Society member S. LEMARCHAND, of Paris, in November 1953, at the age of 77 years, has been reported by P. E. L. VIETTE. M. LEMARCHAND was a disciple of JOANNIS (see *Lepid. News* 3: p. 77) and specialized on the Microlepidoptera of the French fauna. He described several new species of *Lithocolletis, Scythris,* and *Stigmella* (= *Nepticula*) and took a large part in the Lhomme *Catalogue des Lépidoptères de France et de Belgique.* The collection was given by his family to the Paris Museum; it contains large series of French Microlepidoptera, with 13 LeMarchand types and 1 Meyrick type.

On 7 February 1953, MASAMI WATARI, a lifelong amateur lepidopterist, and a member of The Lepidopterists' Society, died in Tokyo, Japan. He was born there on 5 September 1897. Having finished the law course at the Tokyo Imperial University, he was commissioned to various government posts. Everywhere he was stationed he collected butterflies enthusiastically and named many forms, mostly aberrations.

At least one Hairstreak, from Formosa, was named after him: *Strymonidia watarii* (MATSUMURA), 1927.

TARÔ IWASE, 345 Komachi Kamakura, Kanagawa-Ken, JAPAN

MUSING IN EUROPEAN MUSEUMS

by BERNARD HEINEMAN

Our six weeks sojourn in Europe was so filled with rare lepidopteran experiences that Mrs. HEINEMAN and I thought a resumé might be apropos.

April 12th saw us alight in Paris. The first rainy day took us to the Natural History Museum where Monsieur J. BOURGOGNE, who spoke English well, aided us in our search for types of butterflies from Jamaica, British West Indies. We got off to a good start finding five described by LATREILLE, BOISDUVAL, GODART, and LUCAS. The fine collection was well arranged and pleasant to handle, but damp cold made it uncomfortable for New Yorkers accustomed to steam heat.

Delightful Copenhagen was our next stop. But there, too, the Museum's dark halls and sombre corridors cooled our ardor. The enthusiasm shown by its Director, Dr. S. L. TUXEN, quickly made us forget slight inconveniences. The Zoological Museum had no Jamaican specimens, but we experienced the first of our many strokes of fortune. FABRICIUS' renowned collection was here on loan from Kiel. We were privileged to examine priceless gems collected 150 to 200 years ago. Mrs. SIMPSON was studying them, and her findings should make a valuable contribution to lepidoptery. We discovered many types with data in FABRICIUS' handwriting. Others were inscribed by—but that is Mrs. SIMPSON'S story, not mine.

Before leaving Copenhagen, we saw the beautiful collection of Mr. VILHELM LAURITZEN. He was immersed in two projects—designing the Danish Embassy in Washington and a work on subspeciation of *Papilio machaon.*

Our arrival April 24th at Amsterdam was timed for Holland's floral display which surpassed our greatest expectations, but the Museum was disappointing in that Dr. G. KRUSEMAN could show us no insects from Jamaica.

We visited with Mr. CURT EISNER at The Hague, glancing at his famous *Parnassius* collection. Regrettably Dr. A. DIAKONOFF of Leiden was off for the week-end so we missed meeting him.

London was bubbling over with friendly bustle and breathless preparation for the Coronation.

The British Museum at South Kensington is comparable to The American Museum of Natural History in content and appearance. Its youthful visitors seem to appreciate its wonders, absorbing with propriety the countless exhibits. Mr. NORMAN D. RILEY, Keeper of the Entomological Dept., was an affable man of many intellectual interests (fig. 1). He showed us through the floors housing the Museum's massive collection of millions of specimens. In buildings that had been struck 49 times by German missiles, we were taken unerringly to each of the insects for which we inquired, and here we found most of the types for which we searched.

Brigadier W. H. EVANS aided with "skippers." He is now 77, and though suffering patiently from a wounded leg, works ceaselessly on his "American Hesperidae." Riley's admonition to him was: "Take it easy, Brigadier, but I order you not to die until you complete Part III."

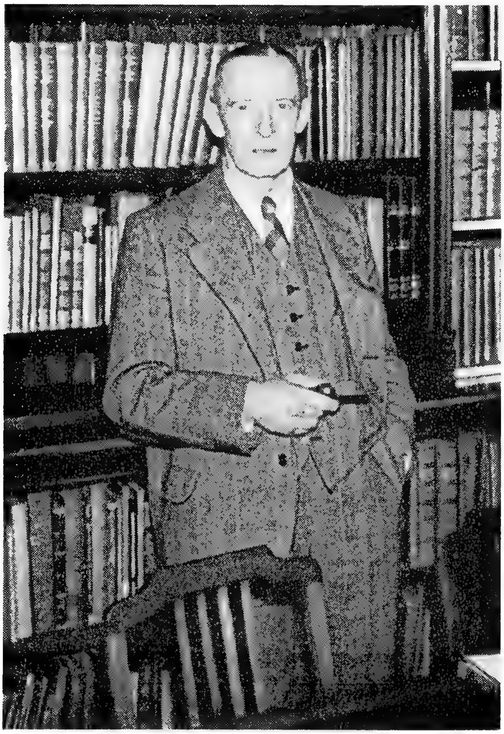

Fig. 1. Mr. N. D. RILEY

On one of our frequent visits to the Museum, we were pleasantly surprised to run into Dr. EUGENE MUNROE from Ottawa, Canada, working, of course, on Pyralididae. He looked as if he had been up all night, and so he had. His two children had contracted measles.

Now we come to another high spot. Mr. W. H. T. TAMS, who is criticized only for overworking, had recently been made Zoological Director of the Linnæan Society at Burlington House. He escorted us thereto and, with trembling hands, showed us CARL LINNÉ'S acquisitions of the 18th Century and told us in hushed tones that we were the first in years to have handled these precious insects. Our flash photographs show a box containing *Danaus plexippus* about whose nomenclature there storms such discussion. It is a male labelled "*Archippus Fab*.4.49 Marsham." The handwriting, according to TAMS, is that of Sir JAMES EDWARD SMITH Kt., former President of the Linnæan Society. There is a small bull's eye label bound in red similar to those used to indicate "type." Underneath are four females with broad white bands towards the tip of the primaries. They are marked "*plexippus*" in Linnæus' handwriting, and each label is marked "East Indies." (Fig. 2.)

At a later date we visited Mr. FRANCIS HEMMING, Secretary of The International Commission on Zoological Nomenclature. It is around him and his committee that most of the *Danaus plexippus* hubbub centers. We had hoped to see a photograph that HEMMING was reported to have taken of the type of *Hypolimnas misippus* L., but it was not to be found, so our next itinerary will include a trip to the Linnæan collection at Uppsala, Sweden, where the insect is reputed to be.

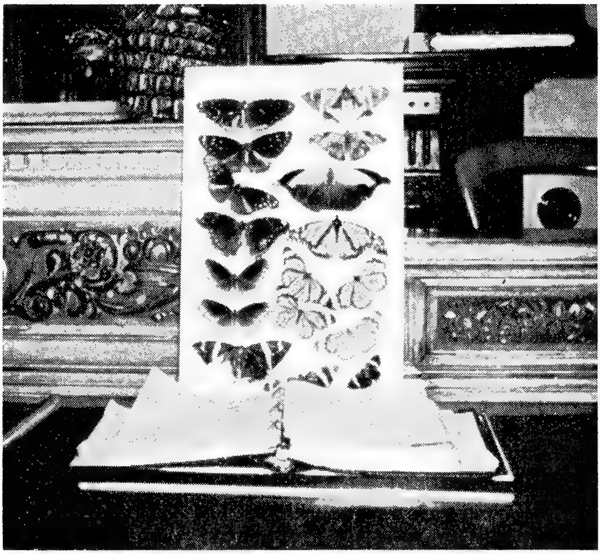

Fig. 2. Specimens in LINNÉ Collection

An afternoon with Mr. W. J. KAYE at his charming home at Guildford was most rewarding. He is now a hearty 78. KAYE it was who, in 1926, wrote the first all inclusive paper on Jamaican butterflies. He collected there for years, assisted by Miss LILY PERKINS. His works and those of AVINOFF and SHOUMATOFF are important contributions to Jamaican lepidoptery. In his immaculately kept collection, we found all the types he had described except *Thecla Bourkei* which he claimed was in the Hope collection at Oxford University. We searched there, unsuccessfully.

Mr. KAYE forwarded to us the following letter:

"Professor VARLEY has handed your letter regarding the type of *Thecla Bourkei* over to me.

"I very much regret to say that a further exhaustive search of all possible places has failed to reveal this type. Mr. HEINEMAN himself went over the drawers while he was here and could find no trace of the specimen. The Bourke collection is virtually intact, but in one of the drawers containing Trinidad Lycænidæ is a strip of paper (obviously indicating that specimens have been removed) which reads A/B/C/D/E/F/ but that is the only clue, and it seems clear that the butterflies were not replaced.

"I do not think there is anything more we can really do. It is very distressing to find this very rare specimen is missing.

Yours faithfully,

ERNEST TAYLOR, Chief Assistant."

Needless to say, any information leading to the location of the *Thecla bourkei* type will be very valuable. We did not come away from Oxford fruitlessly, however, for a short glance through JONES' *Icones* left us with an insatiable desire to review that unique and sensational book.

Next we went to the Tring Museum, a modern edifice superbly located in delightful surroundings. Its rooms are light, clean, and airy with high ceilings and wide aisles between its long rows of spacious cabinets. The fabulous Dr. KARL JORDAN, its curator, is now 92. His daughter told us that he works 6 days a week from 10 mornings to 7 evenings. He interrupted his application to fleas to help us find *Papilio thoas melonius* and *Papilio polydamus jamaicensis,* Both of which he and Lord ROTHSCHILD had described. We had been unable to locate the types, but he proceeded directly to the drawer containing *P. thoas melonius* extracting therefrom an insect, on the pin of which was attached an envelope containing its genitalia. This, Dr. JORDAN said, was the type—and it has now been so labelled. He insisted that the type of *P. polydamus jamaicensis* was with the series that had been presented to the British Museum, and when subsequently those insects were reexamined, one was found with an envelope containing genitalia, and this has now been added to the type collection. A dinner date in London caused us, regretfully, to rush off so that we did not even get a photograph of Dr. JORDAN.

Mr. C. BERNARD LEWIS, Curator of the Jamaica Institute at Kingston writes that he has seen, but not captured, some pierids that may be new to Jamaica. We go there in Feb. 1954 with the hope of obtaining some of these butterflies. Our 1955 plans are to return to Europe to continue our interesting studies in foreign museums.

247 Church Street, New York 13, N.Y., U.S.A.

SALMON'S FLUID, A NEW MOUNTING MEDIUM FOR SLIDES OF SMALL LARVAE AND LARVAL PELTS OF LEPIDOPTERA

by PETER F. BELLINGER

The study of very small larvae of the Lepidoptera and other groups of insects is a matter of some difficulty. Many minute characters such as the head and body setae are almost impossible to make out with direct illumination and the magnifications available on most dissecting microscopes. Specimens can of course be cleared and mounted in balsam or clarite, but this involves extensive and tiresome handling.

Several years ago Dr. JOHN T. SALMON of the Dominion Museum in Wellington, New Zealand, described a technique which has proved very satisfactory for small arthropods of all sorts. This mounting medium contains lactic acid, phenol, and polyvinyl alcohol; a number of variations are possible, depending on the qualities desired. Since the description was published in a rather little-known journal and the method does not seem to be well known in America, it seems worth while to call it to the attention of Society members.

The advantages of this technique are as follows: 1. specimens may be mounted directly from water or alcohol of any strength; 2. clearing takes place very rapidly and thoroughtly in the medium itself; 3. the refractive index of the hardened medium is very low, and the definition is far superior to that in balsam (in which fine structures may become transparent to the point of invisibility); 4. mounts, unlike those made with other water-soluble media, appear to be permanent (although the technique has not been in use long enough to make this certain).

DIRECTIONS FOR THE PREPARATION AND USE OF SALMON'S FLUID

1. Prepare lactophenol solution by dissolving 45 g. phenol crystals in 45 cc. lactic acid (heat).
2. Dissolve 2.5 g. polyvinyl alcohol in 10 cc. distilled water.
3. Add 25 cc. lactophenol solution and clear in water bath.

Steps 2 and 3 may be combined. Clearing may take several hours. The viscosity and other characteristics of the resulting medium will vary somewhat according to the type of polyvinyl alcohol used.

Specimens may be mounted directly from water or alcohol. Slides should be dried on a slide warmer for a day or more; if the medium has a low viscosity it may be necessary to add small amounts of medium at the edge of the cover slip.

Specimens may be cleared immediately by warming the slide over an alcohol lamp; this permits immediate examination of the slide, and also removes any air bubbles trapped under the cover slip. If the specimen contains any considerable amount of air it may be desirable to remove this before mounting; this may be done by attaching a closed vessel containing the specimen to the side of a laboratory water faucet.

Salmon's Fluid will darken if exposed to light; however, this will not affect the visibility of the specimen except perhaps in very thick mounts.

This technique is applicable chiefly to animals which can be reduced essentially to two dimensions. With larger specimens it may be necessary to remove the body contents or to macerate with potassium hydroxide; the latter procedure will also render very heavily pigmented specimens more transparent.

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University College of the West Indies, Mona, St. Andrew, Jamaica, B.W.I.

FIELD AND TECHNIQUE NOTES

FAGITANA LITTERA REARED FROM LARVA

A green larva feeding on the Marsh-fern, *Aspidium thelypteris* (L.)Sw., in a cranberry bog near Riverhead, Long Island, N. Y., was taken on June 25, 1953. The larva refused other plants as food but continued to eat fresh offerings of this fern for eight days. It finally wove together a loose cluster of fronds and pupated therein.

Green larvæ are so usual in marshes that slight consideration was given to this specimen. On the morning of July 26 a female *Fagitana littera* Wlk. emerged.

In my series of 20 light-caught specimens of this species collected during 25 years in Orient, 30 miles east of Riverhead, only one female is represented, an indication that the females do not fly as freely as the males. Not more than two have been taken in a season, usually one or none. Since the annual burning of the local marshes for mosquito control 12 years ago, no *F. littera* has been observed in Orient. This could mean that the egg is the over-wintering stage and that fires have eradicated this species locally, as fires have various species of *Papaipema* in this region.

The food plant, in the above case, is one of the most common and generally distributed species in the East, while *F. littera* is apparently a scarce species throughout its range.

The light captures in Orient are all between June 4 and July 12. There are published records to late September.

The data secured on the reared example prove it to have been a robust, smooth, slow-acting larva, approximately 1¼ inches in length, in color a light green with a faint pinkish cast laterally. It pupated in a loose cluster of fronds near the top of the fern, the clustered foliage so open that detection would be scarcely noticeable to casual observation in the field.

There appears to be no record of the early stages of *F. littera* in the literature nor knowledge of them through correspondence from lepidopterists.

ROY LATHAM, Orient, Long Island, N.Y., U.S.A.

THE APPARENT INFLUENCE OF ISOLATION IN SOME SPECIES OF GEOMETRIDÆ

If I may be allowed to say so, Mr. PRONIN'S remarks in the opening paragraph of his paper of the above title (*Lepidopterists' News,* vol. 6: p. 93; 1952) betray a lack of research amongst current literature on Industrial Melanism.

I do not think that it was ever denied that melanics in industrial areas obeyed the ordinary rules of genetics, although Mr. PRONIN in his remarks on his brood of black *A. betularia* rather implies that it was.

The experiments of HARRISON with Geometrid larvae fed on food-plants impregnated with the salts of lead and manganese were said to produce a form of melanism that behaved as a recessive. MCKENNY HUGHES repeated the experiments but did not obtain confirmatory results, and it has been suggested that, although HARRISON'S original material came from areas where melanism was unknown, a moth carrying a melanic gene was, somehow or other, introduced. IMMS (*Recent Advances in Entomology* (2nd edit.), pp. 198-9; 1937) summarizes the situation.

I think the more generally accepted view amongst entomologists in Great Britain, where the phenomenon of industrial melanism is most evident, is that the soiling of the usual resting places of moths—rocks, tree-trunks, etc.—by soot in industrial areas has made it easier for any melanic mutant to survive and produce offspring, as it is far less noticeable than it would be on rocks or tree-trunks that were unsoiled. If, as seems often to be the case, these melanics are dominants, the spread of the black through the normal coloured population is very rapid, and this would be even more pronounced in small isolated colonies.

D.G. SEVASTOPULO, P.O. Box 401, Kampala, UGANDA

RECENT LITERATURE ON LEPIDOPTERA

A. GENERAL WORKS

Pavil'shchikov, N. N., *Descriptive list of insects. A short descriptive list of the most common insects occurring in the European part of the USSR* [in Russian]. 2d edition. 543 pp.; illustrated. Moscow, 1950. [Not seen].

Phinhey, E. C. G., *Butterflies of Rhodesia.* iv + 208 pp., 21 pls., 13 figs. Rhodesia Scientific Association. Apr. 1949. See review in *Lep. News,* vol. 7: p. 25.

Schvanvich, B. N., "On the interrelation of orders of the higher insects in connection with the origin of flight. II. Division of Pterygota into a series of orders according to the degree of specialization" [in Russian]. *Zool. Zhurn.,* vol. 27: pp.137-148. 1948. [Not seen].

Swain, R. B., *The insect guide: orders and major families of North American Insects.* 261 pp. Garden City, N. Y.: Doubleday. 1948.

Wolcott, George N., "The insects of Puerto Rico. Lepidoptera." *Journ. Agric. Univ. Puerto Rico,* vol.32: pp. 537-748, figs. "July 1948" [May 1951]. Lists all species recorded from the island, referring to original records; gives biological information when available. Many ssp. figured. [P. B.]

B. SYSTEMATICS AND NOMENCLATURE

Agenjo, R., "Nuevo *Agdistis* beticomaroqui (Lep. Pterophoridæ)" [in Spanish]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.121-124, 2 figs. March 1953. Describes as new *A. bifurcatus* n. sp., from Iebel-Tual (Morocco) and Cadiz (Spain); figures genitalia. [A. D.]

Alayo, Pastor, "Notas sobre las especies cubanas de *Eurema* del grupo *elathea-palmira* (Lepidoptera: Pieridæ)" [in Spanish]. *Bol. Hist. Nat. Soc. Cubana Hist. Nat. "Felipe Poey",* vol.2: pp.7-8. March 1951. Regards *palmira* and *cubana* as summer forms of *ebriola* and *elathea* respectively. [P. B.]

Altena, C. O. van Regteren, "Biogéographie du genre *Nyctalemon* Dalman (Lepidoptera, Uraniidæ)" [in French]. *Trans. 9th Int. Ent. Congr.,* vol.1: pp.562-567, 1 fig. March 1953. Divides the genus into three polytypic species, using coloring and markings (genitalia being of small taxonomic value). Gives distribution of the subspecies and discusses their history and origin. (Preliminary paper.) [A.D.]

Bentinck, G. A., "Some special details about very rare or little known Lepidoptera species, including the demonstration of these." *Trans. 9th Int. Congr. Ent.,* vol.1: pp.79-82. March 1953. 1. Gives a review of the history and the nomenclature of *Chrysophanus dispar* L. (Lycænidæ), using quaternaire names. 2. Discusses 13 species of extremely rare Lepidoptera occurring in Holland. [A.D.]

Betrem, J. G., "The genotypes of the Indo-Australian Psychidæ (Lepidoptera)." *Tijdschr. voor Ent.,* vol.95: pp.331-340. 20 Dec. 1952. Gives a list of genera with types and authors of designations. Discusses synonymy of some genera. Suggests *CHALIELLA* nom. nov. for *Chalia* Moore, 1877 (not Walker, 1868), and *PAGODIELLA* nom. nov. for *Pagodia* Docteurs van Leeuwen, 1909 (not Walcott, 1905). [A.D.]

Bonnet, P., "Proposition d'une réglementation pour la formation des termes scientifiques composées (choix de la voyelle de liaison)" [in French]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.189-193. March 1953. Proposes reglementation of the correct formation of composed scientific names or terms. [A.D.]

Braun, Annette F., "The *Æsculus*-feeding species of *Exartema* with description of a new species (Lepidoptera, Eucosmidæ)." *Ohio Journ. Sci.,* vol.51: pp.353-357, 10 figs, Nov. 1951. Describes as new *E. appalachianum* (Carter City, Ky.); notes on 4 other spp. [P.B.]

Brown, F. Martin, "Statistics and taxonomy again." *Lep. News,* vol.6: p.67. 1952.

Carpenter, G. D. Hale, "*Colotis fausta somalica* Hale Carpenter and Jackson, 1950." *Proc. Roy. Ent. Soc. London (B),* vol.20: p.106. 15 Oct. 1951. *C. f. mijurteina* new name for *C. f. somalica, nec* Storace 1949. [P.B.]

Comstock, William P., & F. Martin Brown, "Geographical variation and subspeciation in *Heliconius charitonius* Linnæus (Lepidoptera, Nymphalidæ)." *Amer. Mus. Novit.,* no.1467: 21 pp., 3 figs. 16 Oct. 1950. Describes as new *H. c. ramsdeni* (Matan-

zas, Cuba) *H. c. churchi* (Port-au-Prince, Haiti); *H. c. tuckeri* (Winter Park, Fla.); *H. c. vazquezæ* (Campeche, Mex.); *H. c. bassleri* (La Providencia, Carretera al Mar, Cauca, Colombia, 1300 m.). Analysis of wing length and markings of 8 of the 9 recognized sspp. Figures adults of 7 sspp. and holotype of *H. c. charitonius.* [P. B.]

Diakonoff, A., "Records and descriptions of Microlepidoptera (4)." *Treubia,* vol.21: pp.133-182, 33 figs. 25 Apr. 1951. Describes as new *Epagoge mellosa, ASTROSA leucosema, Tæniarchis argyroiota, Spatalistis hilarochroma, Schœnotenes bathyglypha* (Tortricidæ); *Agriothera cristata* (Amphitheridæ) (all from Java). Reviews fam. Adelidæ, gives a key to Malaysian spp., and describes as new: *Nemophora divina, kalshoveni, chalcobasa, rhodochrysa, micrometalla, chrysodonta, lieftincki, hemidesma, heteroxantha, bifasciella irrorata* (subsp.) (all Java), *chalcodactyla* (Moluccas), *plutodotis* (Celebes), and *liongi* (Borneo); figures genitalia. [A. D.]

Field, William D., "Moths of the genera *Mulona* Walker and *Lomuna,* a new and closely related genus (Arctiidæ: Lithosiinæ)." *Proc. U.S. Natl. Mus.,* vol.102: pp. 221-230, 2 pls. 1952. Describes as new *LOMUNA* (type *Mulona nigripuncta* Hamps.); *Mulona schausi* (Matanzas, Cuba); *M. manni* (Mangrove cay, Andros Is., Bahamas); *M. barnesi* (Santiago de Cuba, Oriente, Cuba). Genitalia of the known spp. figured. Keys to separate genera and to spp. of *Mulona.* Genera confined to Bahamas and greater Antilles. [P.B.]

Fleming, Henry, "A new genus and species of Lithosiinæ (moths) from Rancho Grande, North-central Venezuela." *Zoologica, N. Y.,* vol.36: pp.183-184, 1 fig. 20 Oct. 1951. Describes as new *PSEUDOMACROPTILA argentea;* figures venation. [P.B.]

Fletcher, D. S., "Four new species of Geometridæ (moths) from Rancho Grande, North-central Venezuela." *Zoologica, N.Y.,* vol.37: pp.101-104, 1 pl., 7 figs. 19 Sept. 1952. Describes as new *Racheospila beebei, Oospila zamaradaria, Melanoptilon collinsi, Nelo glaucata.* Figures adults and genitalia. [P.B.]

dos Passos, Cyril Franklin, "The distribution of *Œneis taygete* Geyer in North America with descriptions of new subspecies (Lepidoptera, Satyridæ)." *Amer. Mus. Novit.,* no.1399: 21 pp., 16 figs. 26 Jan. 1949. Describes as new *O. t. gaspeensis* (Mt. Albert, Quebec); *O. t. fordi* (Kuskokwim R., Alaska); *O. t. edwardsi* (San Juan Mts., Hinsdale Co., Colo.). Redescribes *O. t. taygete.* Figures adults. Does not consider *hanburyi* a subspecies of *taygete.* [P.B.]

Roepke, W., "Het genus *Trabala* (Lep. Lasiocampidæ)" [in Dutch]. *Verslag 82e Wintervergadering Nederl. Ent. Veren*: pp. iii-v. 15 Apr. 1951. A preliminary report on the following paper. [A.D.]

Roepke, W., "The genus *Trabala* Wlk. in the Far East (Lep. Het., fam. Lasiocampidæ)." *Meded. Landbouwhogeschool Wageningen,* vol.50: pp.105-133, 14 pls., 2 figs. 18 June 1951. Describes as new: from the Malay Archipelago: *T. krishna,* f. ♀ homichlora, *T. brahma, ganesha, arjuna, shiva, gautama, garuda, hantu, indra;* from the Philippines: *T. mahatma, subadra, sudara, rama, durga, mahadeva. T. vishnu* Mr. is confined to continental Asia, all insular records of this species are erroneous; the common Javanese species is *T. pallida* Wlk. Gives figures of genitalia, photographs and colored plate of the species. [A.D.]

Stempffer, H., "La réserve naturelle intégrale du Mt. Nimba. IX. Lépidoptères Lycænidæ" [in French]. *Mém. Inst. Franç. Afr. Noire,* no.19: pp.145-149, 2 figs. 1952. Describes as new *Pseudaletis richardi* (Mt. Nimba, Fr. West Africa); figures adult and ♂ genitalia. Records 17 other spp., listing ranges. [P. B.]

Tilden, J. W., "Concerning the identity of *Mitoura nelsoni muiri.*" *Lep. News,* vol.6: pp.95-96, 1 fig. 19 Feb. 1953.

Wohlfahrt, Th. A., Über den wert wenig bebachteter Merkmale für die Klassification der Schmetterlinge" [in German, English summary]. *Lep. News,* vol.6: pp.13-27, 9 figs. 8 Aug. 1952.

Zagulyaev, A. K., "The Eastern Furry Moth (Lepidoptera, Tineidæ)—a new species of moth from the Primorsk region" [in Russian]. *Zool. Zhurn.,* vol. 31: pp.284-287. 1952. Describes as new *Tinea eurinella.* [Not seen].

C. MORPHOLOGY AND CYTOLOGY

Henke, Karl, & Heinz-Joachim Pohley, "Differentielle Zellteilung und Polyploidie bei der Schuppenbildung der Mehlmotte *Ephestia kühniella* Z." [in German]. *Zeitschr. Naturforsch.,* vol.7b: pp.65-79, 9 figs. Feb. 1952. Study of cell lineage and cell division in developing hind wing, in relation to polyploidy of scale-forming cells. [P. B.]

Hinton, H. E., "The structure and function of the endocrine glands of the Lepidoptera." *Proc. S. London Ent. Nat. Hist. Soc. 1950-51:* pp.124-160, 19 figs. Dec. 1951. Review article, summarizing recent work on retrocerebral system, brain, and prothoracic glands, and hormonal control of metamorphosis. [P. B.]

Krumins, Rolfs, "Die Borstenentwicklung bei der Wachsmotte *Galleria mellonella* L." [in German]. *Biol. Zentralbl.,* vol.71: pp.183-210, 13 figs. 1952. Histology of setal formation in all stages. [P. B.]

de Lesse, Hubert, "Formules chromosomiques nouvelles du genre *Erebia* (Lépid. Rhopal.) et séparation d'une espèce méconnue" [in French]. *C. R. Acad. Sci.,* vol.236: pp.630-632, 1 fig. 1953. Records haploid numbers for 8 forms of *Erebia;* separates 'form' *rondoui* (n=24) from *E. tyndarus* (n=8) and makes it a subspecies (?) of *E. hispania* (n not given). [P. B.]

Lustig, K., Über Hormonorgane bei Insekten. Die Histologie der Corpora allata und Prothoraxdrüsen beim grossen Kohlweissling" [in German]. *Mikrokosmos,* Vol.41: pp.85-89, 4 figs. Jan 1952. Histology of endocrine glands in larva of *Pieris brassicæ.* [P.B.]

Mercer, E. H., & M. F. Day, "The fine structure of the peritrophic membranes of certain insects." *Biol. Bull,* vol. 103: pp.384-394, 8 figs. Dec. 1952. Electron microscope studies, including *Galleria mellonella* and *Pieris rapæ.* [P. B.]

Pryor, M. G. M., "On the abdominal appendages of larvæ of Trichoptera, Neuroptera, and Lepidoptera, and the origins of jointed limbs." *Quart. Journ. Micr. Sci.,* vol.92: pp.351-376, 30 figs. Dec. 1951. Describes morphology of anal prolegs in these orders, with particular reference to musculature; concludes that these structures in Lepidoptera are not necessarily homologous with those in other orders. [P. B.]

Riabov, M. A., "Basic morphological characteristics of cutworms (Lepidoptera, Agrotidæ)" [in Russian]. *Ent. Obozr.,* vol.31: pp.474-484. 1951. [Not seen.]

Ryszka, Hans, "Über Gynandromorphe (Gynander) von *Lasiocampa trifolii* Esp. und *Colias croceus* Fourer" [in German]. *Zeitschr. Wiener Ent., Ges.,* vol.33: pp.82-84. 1 Nov. 1948. Describes two bilateral gynandromorphs. [P. B.]

Schvanvich, B. N., "Findings on the localization of the wing pattern in Lepidoptera" [in Russian]. *Ent. Obozr.,* vol.31: pp.485-494. 1951. [Not seen.]

Short, J. R. T., "Some aspects of the morphology of the insect head as seen in the Lepidoptera." *Proc. Roy. Ent. Soc. Lond. (A),* vol.26: pp.77-88, 18 figs. 15 Sept. 1951. Morphology of head of larval and adult *Dilina tiliæ,* and a discussion of the terminology of Hinton and Snodgrass and their views on morphology of the head in Lepidoptera. [P. B.]

D. VARIATION AND GENETICS

Burmann, Karl, "Eine neue Form von *Parnassius appollo* L. var. *claudius* Bell f. g. *phrynius* Fruhst." [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.34: pp.43-44, 1 pl. 15 Mar. 1949.

Burmann, Karl, "Zwei neue Formen von *Anisotænia ulmana* Hb. aus Nordtirol. (Lepidoptera, Tortricidæ)" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.34: pp.43-44, 1 pl. 15 Mar. 1949.

Cockayne, E. A., "Aberrations of British Macrolepidoptera." *Entomologist,* vol.84: pp. 241-245, 1 pl. Nov. 1951. Proposes 25 new names (Lymantriidæ and Lasiocampidæ). [P. B.]

Collier, A. E., "A new aberration of *Agapetes galathea* (Lep. Satyridæ)." *Entomologist,* vol.85: p.5, 1 pl. Jan. 1952.

Dowdeswell, W. H., & E. B. Ford, "The distribution of spot-numbers as an index of geographical variation in the butterfly *Maniola jurtina* L. (Lepidoptera: Satyridæ)." *Heredity,* Vol.6: pp.99-109, 6 figs. Apr. 1952. Analysis of local variation in numbers of spots on the underside of the hind wing; variation occurs in ♀ only. No simple correlation with locality was found. Populations studied were on the mainland and some coastal islands. [P. B.]

Ford, E. B., "The genetics of polymorphism in the Lepidoptera." *Advances in Genetics,* vol.5: pp.43-87. 1953. Review of knowledge of "transient polymorphism" (Industrial Melanism) and balanced polymorphism (including mimicry). [C. L. R.]

Galvagni, Egon, "Eine interessante Form der *Hybernia aurantiaria* Esp.: f. n. *venosaria*" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.32: pp.103-104. 30 June 1948.

Kikkawa, Hideo, "Biochemical genetics of *Bombyx mori* (Silkworm)." *Advances in Genetics,* vol. 5: pp.107-140, 11 figs. 1953. Combined studies of genetics and chemistry of *B. mori* reviewed, particularly emphasizing pigment formation. [C.L.R.]

Loritz, Jean, "Supplementary remarks on *Erebia* in the French Hautes Alpes and Alpes Maritimes." *Entomologist,* vol.84: pp.230-231. Oct. 1951. Notes on 4 spp., names one aberration. [P. B.]

Owen, D. F., "A new aberration of *Erebia æthiops* (Esper) (Lep. Satyridæ)." *Entomologist,* vol.85: p.92. Apr. 1952.

Sevastopulo, D. G., "Genetics of East African Lepidoptera: III." *Entomologist,* vol.85: pp.88-89. Apr. 1952. Describes a sex-controlled color mutant in *Dasychira georgiana,* expressed in larva only. [P. B.]

Sheppard, P. M., "A quantitative study of two populations of the moth *Panaxia dominula* (L.)." *Heredity,* vol.5: pp.349-378, 5 figs. Dec. 1951. Study of phenology, population size, and frequency of mutant varieties in the populations. Describes a new genetic variety. Reports change in the selective advantage of a pattern mutant, without VISIBLE corresponding change in environment. [P.B.]

Sheppard, P. M., "A note on non-random mating in the moth *Panaxia dominula.*" *Heredity,* vol.6: pp.239-241. Aug. 1952. Experimental evidence for selective pairing between moths of dissimilar, rather than similar, genotype with respect to pattern characters. [P. B.]

Simonov, N. S., "Technical question on the nature of new races of the Mulberry Silkworm" [in Russian]. *Dokl. Vses. Akad. Sel'skokoz. Nauk im V. I. Lenina,* vol.15, part 12: p.42. 1950 [Not seen].

Smith, P. Siviter, "Segment, marking, and other abnormalities in lepidopterous larvæ." *Entomologist,* vol.84: pp.273-275, 2 pls. Dec. 1951. Malformations in 3 unidentified larvæ. [P. B.]

Tanaka, Yoshimaro, "Genetics of the Silkworm, *Bombyx mori.*" *Advances in Genetics,* vol.5: pp.239-317, 27 figs. 1953. Detailed and well illustrated review of the knowledge of genetics of the Silkworm, especially that discovered since 1930. An important summary, particularly because much original literature is in the Japanese language. [C. L. R.]

Wolfram, Rosemarie, "Die Ommochrom-Menge in den Malpighischen Gefässen bestimmende Allele der Mehlmotte *Ephestia kühniella*" [in German]. *Zeitschr. Naturforsch.,* vol.3b: pp.291-293, 2 figs. 1948. Genetic control of amount of ommochrome pigment in Malpighian tubules. [P. B.]

E. DISTRIBUTION AND PHENOLOGY

Adamczewski, Stanislaw, "The moths of Warsaw-City" [in Polish, English summary]. *Fragm. Faun. Mus. Zool. Polonici,* vol. 6: pp. 111-128. 12 Feb. 1951. Lists 155 spp. taken at light in the ruins, and groups them according to their status in the fauna. [P.B.]

Arnhold, F. R., "Notes on collecting *Anthocaris midea* and *Euchloe olympia.*" *Lep. News,* vol.6: pp.99-100. 19 Feb. 1953.

Bentinck, G. A., "Nieuwe en zeldzame Lepidoptera" [in Dutch: New and rare Lepidoptera]. *Verslag 82e Wintervergadering Ned. Ent. Veren*: pp. xiv-xv. 15 Apr. 1951. 6 spp. new for the Dutch fauna. [A.D.]

Bentinck, G. A., "Faunistiche aantekeningen betreffende Nederlandse Lepidoptera" [in Dutch: Faunistic notes on Netherland Lepidoptera]. *Tijdschr. Ent.,* vol.94: pp.307-337. 22 Aug. 1951. Gives an annotated list of species discovered in Holland since 1938. [A. D.]

Bernardi, G., & H. Stempffer, "Notes sur quelques Rhopalocères (Lep.) recueilles par P. de Mire au Tibesti et au Mortcha" [in French]. *Bull. Soc. Ent. France,* vol. 56: pp. 47-48. 1951. Notes on 6 spp. of Pieridae and 2 Lycaenidae from the Sahara. [P.B.]

Betts, F. N., "On a collection of butterflies from the Balipara Frontier Tract and the Subansiri Area (Northern Assam)." *Journ. Bombay Nat. Hist. Soc.,* vol. 49: pp. 488-502, 1 map. Dec. 1950. Annotated list. [P.B.]

Betz, J.-T., "Une nouvelle station française de *Boloria aquilonaris* et d'*A. aphirape* Hbn." [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 130-134. "Sept.-Oct." 1949 [25 Jan. 1950].

Betz, J.-T., "Deuxième note sur *Boloria aquilonaris* Stch. et *Argynnis aphirape* Hbn. dans les Ardennes françaises" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 335-337. "Nov.-Dec. 1950" [8 May 1951].

Beuret, Harni, "A propos de *Plebejus argus* L. (Lep. Lycænidæ) de la région de Nîmes (Gard)" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 225-232. "Mar.-Apr." [25 Sept.] 1950. Phenological notes on *P. a. pseudohyochiona.* [P.B.]

Birkett, Neville L., "Some notes from South Westmoreland, 1950." *Entomologist,* vol. 84: pp. 34-35. Feb. 1951. Lepidoptera.

Blackie, J. E. H., "The range and distribution of *Strymonidia pruni* (L.) (Lep. Lycænidæ)." *Entomologist,* vol. 83: pp. 246-248. Nov. 1950.

Blair, K. G., "*Eupithecia arceuthata* Freyer in the Isle of Wight." *Entomologist,* vol. 84: pp. 158-159. July 1951.

Brown, R. C., H. J. MacAloney, & P. B. Dowden, "The Spruce Budworm." *U. S. Dept. Agric. Yearb. 1949*: pp.423-427, 1 map. Distribution, biology, control.

Burgeff, H., "Verbreitungsstudien an der Gattung *Zygæna* Fab. (Lepidoptera) (Mit besonderer Berüchsichtigung des Problems der zwischen- und nacheiszeitlichen Besiedlung der Alpen). I." [in German]. *Portug. Acta Biol. (A)*, vol. R. B. Goldschmidt, pp.663-725, 6 figs, 21 maps. 1951. Origin and distribution of the European fauna of *Zygæna,* with special reference to the Mediterranean-Alpine area. [P. B.]

Burmann, Karl, "Ein kleiner Beitrag zur Kenntnis der Verbreitung von *Exapate duratella* Heyd. (Microlepidoptera, Tortricidæ)" [in German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 9-11. 15 Apr. 1951.

Cary, Margaret M., "Collecting hawkmoths in Jamaica." *Frontiers,* Vol.13: pp.44-45. Dec. 1948.

Cary, Margaret M., "Cloud forest adventures." *Frontiers,* vol.14: pp.34-38, 61, 4 figs. Dec. 1949. Collecting Sphingidæ in Venezuela. [P. B.]

Chugunin, IA, "The focal cyclic rotation in the mass outbreak of the Gypsy Moth" [in Russian]. *Zool. Zhurn.,* vol.28: pp.431-438. 1949. [Not seen.]

Doets, C., "Lepidopterologische mededeelingen over 1950-1951" [in Dutch]. *Ent. Ber.,* vol.14: pp.177-181, 196-200, figs. 1 Dec. 1952, 1 Jan. 1953. Gives notes on systematics and biology of rare species of Microlepidoptera. Records *Mompha nodicolella* Fuchs (Momphidæ) as new for the Dutch fauna. [A. D.]

Emme, A. M., "Variability and hereditability of the sensitivity to cold of the pupa of the mulberry silkworm when it is in diapause." [in Russian]. *Dokl. Akad. Nauk SSSR.,* vol.75: pp.119-122. 1950.

Ferguson, D. C., "The Lepidoptera of Nova Scotia. Part I. Macrolepidoptera." *Proc. Nova Scotia Inst. Sci.,* vol.23: pp.110-111. March 1953. Abstract only.

Franz, Elli, "Sphingidæ de El Salvador" [in Spanish]. *Comun. Inst. Trop. Invest. Cient. El Salvador,* no.4 pp.14-17. Oct. 1952. Annotated list of 33 spp.

Frazer, J. F. D., "Notes on a colony of *Colias crocea* Fourcroy." *Entomologist,* vol. 84: pp. 25-29. Feb. 1951.

French, R. A., "Lepidoptera at light in a Hertfordshire wood in July, 1949." *Entomologist,* vol. 84: pp. 49-55. Mar. 1951. Records of 187 spp. [P.B.]

Gorter, A. J., "Uitbreiding van het vlieggebied van verschillende Macrolepidoptera" [in Dutch: Extension of flying area of various M.]. *Ent. Berichten,* vol. 13: pp. 321-323. 1 Sept. 1951. Deduces from faunistic notes that several rare Lepidoptera seem to disperse over Holland in western and northern directions. [A.D.]

Grabe, Albert, "Faunistische Beobachtungen aus Westfalen" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 56-57. 1 May 1950. Notes on distribution and biology of 8 moths. [P.B.]

Gremminger, Alois, "Lepidopterologisches über den Kaiserstuhl" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 49-52. 1 May 1950. Annotated list.

Hackman, Walter, "Lepidopterologiska iakttagelser i Utsjoki socken 1949" [in Swedish]. *Notulæ Ent.,* vol.30: pp.18-22, 1 fig. 1950. Annotated list.

Hackman, Walter, "On the insect fauna of Cyprus. Results of the expedition of 1939 by Harald, Håkan and P. H. Lindberg. IX. Lepidoptera." *Comment. Biol. Soc. Sci. Fennica,* vol.13, no.8: 9 pp., 1 fig. 17 Mar. 1952. Anotated list of some 100 spp. in 23 families.

Harper, G.W., "*Eupithecia arceuthata* (Lep. Geometridæ) in West Sussex." *Entomologist,* vol. 84: pp. 162-163. July 1951.

Harrison, J. W. Heslop, "Lepidoptera in the Outer Hebrides in 1950." *Entomologist,* vol. 83: pp. 241-245. Nov. 1950.

Hessel, Sidney A., "A new altitudinal high for *Erora læta.*" *Lep. News,* vol.6: p.34. 8 Aug. 1952.

Jones, J. R. J. Llewellyn, "An annotated check list of the Macrolepidoptera of British Columbia." *Occas. Pap. Ent. Soc. Brit. Columbia,* no. 1; 148 pp. 14 June 1951. See review in *Lep. News,* vol.6: p.79.

Jost, Hans, "*Pristophora florella* Mann in der Pfalz (Lep., Pyralidæ)" [in German]. *Zeits. Lepidopt.,* vol. 1: pp. 45-48, 1 pl., 1 map. 1 May 1950. Describes and figures this southern species, and discusses its distribution. [P.B.]

Knowlton, George F., "Observations of *Celerio lineata,* the White-Lined Sphinx, in Utah." *Lep. News,* vol.7: pp.11-12. 20 Apr. 1953.

Loberbauer, Rudolf, "*Rhyacia subrosea* Steph. v. *kieferi* Rbl. in Österreich, ein bemerkenswerter Neufund" [in German]. *Z. Wiener Ent. Ges.,* vol. 62: pp. 81-83. 1 Aug. 1951.

van der Neulen, G. S. A., "Zeldzame en bijzondere Macrolepidoptera" [in Dutch: Rare and peculiar Lepidoptera]. *Verslag 82e Wintervergadering Nederl. Ent. Veren:* p. xiv. 15 Apr. 1951.

Olivier, Robert, "*Gortyna leucostigma* Hübner (Noctuidæ) en Basse-Normandie" [in French]. *Rev. Franç. Lépid.,* vol. 12: pp. 170-172, 1 map. "Nov.-Dec. 1949" [26 Apr. 1950].

Owen, D. F.' "The Butterflies of Darent Wood." *Entomologist,* vol. 84: pp. 172-174. Aug. 1951.

Owen, J. E., "The Rhopalocera of the Darent valley between Shoreham and Eynsfort, Kent." *Ent. Rec. Journ. Var.,* vol. 62: pp. 73-75. Sept. 1950:

Remont, M., "Les *Lycæna dispar carueli* Le Moult de Belgique" [in French]. *Lambillionea,* vol. 50: pp. 38-41, 1 pl. 25 Apr. 1950. Figures series of *L. d. carueli* and of *L. hippothoe.* [P.B.]

Valletta, Anthony, "Moths taken in Malta at light, 1948-1949." *Ent. Mon. Mag.,* vol. 86: pp. 306-308. Oct. 1950.

Valletta, Anthony, "Recent additions to the known Lepidoptera of the Maltese Islands (Heterocera)." *Entomologist,* vol. 83: pp. 252-254. Nov. 1950. 18 new records [P.B.]

Warnecke, Georg., "Zur Verbreitung von *Sedina büttneri* Hering" [in German]. *Zeits. Lepidopt.,* vol. 1: p. 29. 1 May 1950.

Warnecke, Georg, "Sommeerfugle fra Island" [in Danish]. *Flora og Fauna,* vol. 57: pp. 41-44. 1951. Annotated list of 8 Noctuidæ and 9 Geometridæ, and list of 13 micros, from Iceland. [P.B.] *N*

Winters, J., "Overzicht der vangsten van Macrolepidoptera in Vollenhove" [in Dutch: Capture of Macrolepidoptera in Vollenhove, Holland]. *Ent. Berichten,* vol. 13: pp. 309-312. 1 Aug. 1951.

van Wisselingh, T. H., "Belangrijke vangsten van Lepidoptera in 1949" [in Dutch:

van Wisselingh, T. H., "Waarnemingen omtrent Macrolepidoptera in 1950" [in Dutch: Observations on M. in 1950]. *Verslag 83e Wintervergadering Nederl. Entom. Vereeniging*: pp. XXXVI - XXXVIII. 1 Feb. 1952.

Important captures of Lepidoptera in 1949]. *Verslag 82e Wintervergadering Nederl. Ent. Veren*: pp. ii-iii. 15 Apr. 1951.

de Worms, C.G.M., "A collecting trip to Abisko, Swedish Lapland, in June, 1950." *Entomologist,* vol. 84: pp. 121-127, 1 pl. June 1951. Describes area; notes on 16 butterflies; list of 11 moths. [P.B.]

de Worms, C. G. M., "British Lepidoptera collecting, 1950." *Entomologist,* vol. 84: pp. 145-153. July 1951.

F. BIOLOGY AND IMMATURE STAGES

Tazima, Y., "Separation of male and female silkworms in egg stage now becomes possible." *Silk Digest* (Tokyo), vol.61: pp.1-3. 1951. (Paper not seen.)

Yaremenko, I. I., "Changes in the structure of the cocoon of the Chinese Oak Silkworm" [in Russian]. *Dokl. Vses. Akad. Sel'sk Nauk im. Lenina,* vol.16, part 1: p.46. 1951. [Not seen.]

Zalesskii, I. M., "New data on the flight of butterflies" [in Russian]. *Dokl. Akad. Nauk SSSR.,* vol.84: pp.181-184, 4 figs. 1952.

Zhukovskii, A. V., & S. N. Selivanova, "Biological characters of the Stem Moth, the pest of winter-corn cultivation and cereal fodder grasses" [in Russian]. *Dokl. Vses. Akad. Sel'sk. Nauk im. Lenina,* vol.16: pp.32-34. 1951. [Not seen.]

Zweifel, Richard G., "Comparison of food habits of *Ensatina eschscholtzii* and *Aneides lugubris.*" *Copeia,* 1949: pp.285-287, 1 fig. 15 Dec. 1949. Noctuid larvæ are important as food to these salamanders. [P. B.]

Zhelnin, V., "Resistance to cold of the wintering cocoon of the Chinese Oak Silkworm (*Antheræa pernyi* Guer.)" [in Russian]. *Zool. Zhurn.,* vol.31: pp.778-779. Sept./Oct. 1952. [Not seen.]

Zhukovskii, A. V., & T. N. Petrova, "New data on the biology of the Columnar Moth *Ochsenheimeria* sp." [in Russian]. *Zool. Zhurn.,* vol.31; pp.669-672. Sept./Oct. 1952. [Not seen.]

G. PHYSIOLOGY AND BEHAVIOR

Bergold, G. H., "On the nomenclature and classification of insect viruses." *Ann. N. Y. Acad. Sci.,* vol.56: pp.495-516, 4 figs. 31 Mar. 1953. Revises group; redescribes species, with hosts and symptoms. [P. B.]

Butenandt, Adolf, Peter Karlson, & Wolfram Zillig, "Über Dioxo-piperazine aus Puppen des Seidenspinners *(Bombyx mori* L.)" [in German]. *Hoppe-Zeylers Zeitschr. Physiol. Chem.,* vol.288: pp.279-283. Nov. 1951 Identification of four substances extracted from pupa. [P. B.]

Danilevskii, S. ÎA., N. V. Vasil'eva, & A. S. Konokova, "Study of protein metabolism in the Tussah Silkworm (*Antheræa pernyi* G.) with the aid of radioactive methionine" [in Russian]. *Biokhimiia,* vol.17: pp.529-534. Sept./Oct. 1952. [Not seen.]

Emme, A. M., "Hydrochloric acid activation of Mulberry Silkworm gut during the diapause" [in Russian]. *Dokl. Akad. Nauk SSSR.,* vol.88: pp.381-384, 11 Jan. 1953.

Lobashev, M. E., "In regard to the behavior of the Oak Silkworm *(Antheræa pernyi)* in the process of cocoon winding" [in Russian]. *Zhurn. Obshch. Biol.,* vol.13: pp.406-420. Nov./Dec. 1952. [Not seen.]

Olifan, V. I., "Two types of periodicity in post-embryonal development of insects, detected in the study of their growth patterns" [in Russian]. *Dokl. Akad. Nauk SSSR.,* vol.85: pp.1407-1410, 1 fig. Aug. 1952. Including *Bombyx mori.*

Scharrer, Berta, "Comparative physiology of invertebrate endocrines." *Annu. Rev. Physiol.,* vol.15: pp.457-472. 1953. Review article, including recent work on insect hormones. [P. B.]

Schneidermann, Howard A., Ned Feder, & Carroll M. Williams, "The respiration of the Cecropia silkworm in the presence of high pressures of carbon monoxide." *Anat. Rec.,* vol. 108: p. 557. Nov. 1950. Abstract only.

Thorpe, W. H., "Plastron respiration in aquatic insects." *Biol. Rev.,* vol. 25: pp. 344-390, 15 figs. July 1950. Some insects, including *Acentropus niveus,* respire under water by means of a very thin surface film of air retained by hydrofuge hairs and renewable by diffusion from the water; this mechanism permits indefinite submergence. Other mechanisms in aquatic insects, including several Lepidoptera, are discussed. [P.B.]

H. MIGRATION

Beall, Geoffrey, "Migration of the Monarch Butterfly during the winter." *Lep. News,* vol.6: pp.69-70. 1952.

Lack, David, & Elizabeth Lack, "Migration of insects and birds through a Pyrenean pass." *Journ. Anim. Ecol.,* vol. *20:* pp. 63-67. May 1951. Report of a migration including 4 spp. of butterflies, with comments on insect migration in general. [P.B.]

Lempke, B. J., "Tien jaar trekvlinderonderzoek in Nederland" [in Dutch: 10 years of investigations on migratory Lepidoptera]. *Ent. Berichten,* vol. 13: pp. 227-232. 1 Mar. 1951. Survey of results obtained in Holland in 1940-1949; with 2 tables. [A.D.]

Lempke, B. J., "Trekvlinders in 1950 (lle jaarverslag, slot)" [in Dutch]. *Ent. Berichten,* vol. 13: pp. 355-362, fig. 3. 1 Nov. 1951. Discusses 14 spp. of migrating Lepidoptera observed in Holland in 1950; gives a graph of flights of *Plusia gamma.* [A.D.]

I. TECHNIQUE

Lorković, Z., "L'accouplement artificiel chez le Lépidoptères et son application dans les recherches sur la fonction de l'appareil genital des insectes" [in French]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.223-224. March 1953. Artificial copulation was successful in Papilionidæ, Pieridæ, many Nymphalidæ, Satyridæ, and Hesperiidæ; with Heterocera, only in Geometridæ. The copulation is accomplished by using an immobilized female and a severed abdomen of the male, or a comatose male (after compression of the thorax). After the copulation the liberated female deposits fertilized eggs. This method is important for obtaining eggs of species which do not copulate in captivity, and also for crossings. European *Pieris,* several *Euhloë, Erebia,* and *Hesperia* species have been crossed in this way. Also the role of genital parts during copulation could be studied. The old key and lock theory could not be confirmed. (Summary of the paper read at the Congress). [A. D.]

Sit'ko, P. O., "The efficacy of inseminating the Oak Silkworm with mixed semen" [in Russian]. *Dokl. Akad. Sel'sk. Nauk im. Lenina,* vol.15, no.10: pp.39-41. 1950, [Not seen].

NOTICES

Œneis stanislaus, Gyrocheilus tritonia, Speyeria myrtleæ, Speyeria clemencei offered in exchange for North American species needed for my collection. Please send offerta lists. T.W. Davies, 791 Elsie Ave., San Leandro, California, U.S.A.

Morpho hecuba, M. eutropius, and many other Brazilian butterflies for sale. 1953 catch, papered carefully with full data, mostly named. Lots of 80-100 mixed specimens (including at least 5 different species of *Morpho)* on request. Art work butterflies and wings. Jorge Kesselring, Caixa Postal 6, João Pessoa (Paraíba), BRAZIL.

Anyone interested in joining a field trip to Central America please write for details. Also offer to sell a part of my expected catch, in large quantities, to help defray expenses; arrangements should be made beforehand. E.C. Welling, 700 E. 240th St., Euclid 23, Ohio, U.S.A.

Anticorrosive steel insect pins in all lengths, black or white, each 1,000, $1.20 or $1.75; minutens each 1,000, $0.45 or $0.75. Price list of other entomological supplies on request. Dr. H. Wilcke, Kösssen/Tyrol, AUSTRIA.

Wish to exchange Rhopalocera from all over the world. Wanted esp. Papilionidæ (esp. *Parnassius, Papilio, Graphium*), Pieridæ and Nymphalidæ. Have many butterflies from Japan for exchange. Masaki Nakayama, 1-398, Fujihonmachi, Wakamatsu-city, Fukuoka-pref., Kyushu, JAPAN.

Exchange papered named Morphos, Agrias, Caligos, etc., for North American butterflies, moths, cocoons, pupæ, chrysalids. Michael A. Zappalorti, 123 Androvette St., Charleston 13, Staten Island, New York, U.S.A.

Formosan butterflies for sale and exchange. Large quantities available in first class condition, for art work, collections, and research. Common and rare species at lowest prices. Exchange also, in small quantities. Check list and prices on request. Marcus Ling Shiao, No.20, 88th Lane, Wenchow St., Section 4, Roosevelt Road, Taipei, FORMOSA.

Seitz Macrolepidoptera Volume 9, Indo-Australian Rhopalocera, $90.00. Text partially bound; plates complete, unbound. Write for particulars. Thomas W. Davies, 791 Elsie Ave., San Leandro, California, U.S.A.

Wanted: pupæ (in diapause) of any of the North American subspecies of *Pieris napi, P. bryoniæ, P. virginiensis.* Available: pupæ of European *Pieris* subspecies and of certain hybrids. Sydney R. Bowden, 33 South View, Letchworth, Herts., ENGLAND.

For sale: collection of 2000 European Noctuidæ, containing many rarities, all best quality and with full data $170. Collection of 1000 Geometridæ, especially of the High Alps, many rarities, all best quality and with full data $60. Dr. H. Wilcke, Kössen/Tyrol, AUSTRIA.

LIVING MATERIAL

Breeder of U.S. Saturniidæ cocoons for scientific purposes. Please order now for 1954-55 season. Will buy or exchange parasite-free chrysalids of *Papilio* from U.S.A., Mexico, and Canada. Eugene Dluhy, 3912 No. Hamilton Ave., Chicago 18, Illinois, U.S.A.

California moths and butterflies for sale, papered, pinned to suit. Many pupæ available. Inquiry invited. F.P. Sala, 1912 Hilton Drive, Burbank, California, U.S.A.

Hyalophora (= *Platysamia*) *cecropia* cocoons offered in exchange for living pupæ of *Papilio spp.* and Western Saturniidæ. Lincoln P. Brower, Osborn Zoological Laboratory, Yale University, New Haven 11, Conn., U.S.A.

The Lepidopterists' Society

LIST OF MEMBERS

December 1953

The list is arranged alphabetically by nations within each continental area, and by states or provinces in the U. S. A. and Canada. State, province, and nation names are here omitted in the address of each member. The address is followed by the lepidopterological interests. Where only "RHOP.", "MACRO.", or "MICRO." appears, the interest is general within the respective group. "LEPID." is used where interests include all three of the above groups. Following the interests among taxonomic groups are the other aspects of lepidopterology in which the member is interested. The member's name preceded by an asterisk (*) indicates Charter Membership; his name in capital letters indicates Sustaining Membership. The word "Nearctic" here means America north of Mexico. For uniformity "Noctuidæ" is used for all cases, even though the equivalent name "Phalænidæ" had been placed on the membership card by some members. Similarly, *Speyeria, Boloria,* etc. are used for the Nearctic species formerly placed in *Argynnis, Brenthis,* etc. The following abbreviations are used:

LEPID.	— All Lepidoptera	esp.	— especially
RHOP.	— Rhopalocera (butterflies)	Coll.	— Collection
MACRO.	— Macroheterocera (moths)	Ex.	— Exchange
MICRO.	— Microlepidoptera (moths)		

HONORARY LIFE MEMBERS

"Individuals, not exceeding ten in number, who have made important contributions to the science of lepidopterology, may be elected Honorary Members of the Society."

(Constitution, Art.III, Sec.7.)

Brig. W.H. EVANS, Department of Entomology, British Museum (Natural History), London S.W. 7, England, U.K. (Hesperiidæ)

*Prof. WM. T.M. FORBES, Department of Entomology, Cornell University, Ithaca, N.Y., U.S.A. (Lepidoptera: Classification; Biogeography)

*Dr. KARL JORDAN, Zoological Museum, Tring, Herts., England, U.K. (Papilonidæ, Sphingidæ, Saturniidæ)

*Dr. JAMES H. McDUNNOUGH, Nova Scotia Museum of Science, Halifax, N.S., Canada. (Nearctic Lepidoptera)

AFRICA

BELGIAN CONGO

Seydel, Charles, B.P. 712, Elisabethville. LEPID: esp. African. Coll. Sell.

GOLD COAST

Johnson, F.L., United Africa Co., Ltd., P.O. Box 22, Akim-Oda. RHOP: of world, esp. Papilionidæ (esp. *Troides* [=*Ornithoptera*]) and *Charaxes* (African).

SOUTH AFRICA

Duke, Arthur, 17 St. Bede's Rd., Three Anchor Bay, Cape Town.
Wagner, Hans J., P.O. Box 2787, Johannesburg.

UGANDA

Sevastopulo, D.G., Box 401, Kampala. RHOP. MACRO. Life History, Genetics. Coll. Ex.

ASIA AND INDOAUSTRALIA

AUSTRALIA

Common, Ian F.B., Div. of Entomology, C.S.I.R., P.O. Box 109, City, Canberra, A.C.T. MACRO: Australian Noctuidæ. MICRO: Australian Torticidæ. Life History, Behavior, Migration. Coll.
Harman, Ian, c/o Mrs. Bisdee, Appletree Cottage, Dorset Rd., Croydon, Victoria. LEPID: esp. of Victoria. Coll. Ex. Sell.
Holmes, David R., "Holmden", Red Hill, Victoria. RHOP. MACRO. Coll. Ex.
Smith, Vick T.H., 20 Southway, Yallourn, Victoria. RHOP. Coll. Ex.

FORMOSA

Ling Shiao, Marcus, No. 20, 88th Lane, Wenchow St., Section 4, Roosevelt Rd., Taipei.

INDIA

Shull, Ernest M., Ahwa, via Billimora, Dangs District, B.P.

INDONESIA

Straatman, Raymond, Gedong Biara est., p/o Kwala Simpang, Atjeh Timur, N.E. Sumatra. RHOP. and MACRO. Life History, foodplants, literature on Indonesian LEPID.
Wegner, A.M.R., Museum Zoologicum Bogoriense, Bogor.

JAPAN

Azuma, Masao (Prof.), 27/0 Kamiyoshihara-machi, Nishinomiya, Hyogo Pref. MACRO: esp. Geometridæ. MICRO: esp. Pyralididæ. Life History, Distribution. Coll. Ex.
Fujioka, Tomoo, Ho-13, 10 Nishikata-machi, Bunkyo-ku, Tokyo.
Hayano, Ikuo, 337 Shinohara-cho, Kohoku, Yokohama.
Inoue, Hiroshi, Eiko Gakuen, Jesuit High School, Funakoshi-Machi, Yokosuka. MACRO: esp. Geometridæ, Cymatophoridæ, Drepanidæ. Life History. Coll. Ex.
Ishiguro, Tadahisa, 1866 Horiuchi Hayama, Kanagawa-ken.
Iwase, Tarô, 4 Shinhana-cho, Hongo, Tokyo. RHOP. Life History, Migration.
Jacoulet, Paul, Karuizawa, 1371, Nagano Ken, Shinshu.
Kuwayama, Satoru (Dr.), Hokkaido Agricultural Experiment Station, Kotoni, Sapporo. RHOP. MACRO: esp. Noctuidæ. Life History. Economic studies. Coll.
Kuzuya, Takeshi, Minami-Sonomachi 1-3, Nakaku, Nagoya.
Momoi, Shigeyuki, 282 Sannotani, Hommoku, Yokohama.
Nakayama, Masaki, 1-398 Fujihonmachi, Wakamatsu-city, Fukuoka Pref., Kyushu. RHOP: esp. Papilionidæ, Pieridæ, *Parnassius, Anthocaris,* etc. Life History, Distribution. Coll. Ex.
Ogata, Masami (Dr.), Ogata Hospital, No.18, 3-chome, Imabashi, Higashi-ku, Osaka. RHOP: esp. Hesperiidæ. MACRO: Agaristidæ, Arctiidæ. Genitalic studies. Coll. Ex.
Shirôzu, Takashi (Prof.), Biol. Lab., General Education Dept., Kyushu University, Fukuoka. RHOP. Life History, Food Plants, Distribution. Coll.
Takahashi, A., 70, 1-chome Shoeicho, Mizuho-ku Nagoya.
Tsuruta, Ts. (Dr.), c/o Mr. Takahashi, 467 Minami Oizumi Machi, Nerima Ku, Tokyo. LEPID. Life History. Coll. Ex.
Yano, Fumihiko, 1178-2 2cho Uenoshiba-Mukogaokacho, Sakai City near Osaka.

NEW ZEALAND

Salmon, John D. (Dr.), Entomologist, Dominion Museum, Wellington.

PHILIPPINES

Lao, Johnny L.B., P.O. Box 2342, Manila.
SUSON, F.M., 121 Bonifacio St., Cebu City. RHOP. Coll. Ex.
Uichanco, Leopoldo B. (Dr.), Dean of College, Laguna. RHOP. Distribution. Coll.

EUROPE

AUSTRIA

Klimesch, Joseph, Linz a.d. Donau, Donatusgasse 4. LEPID: esp. *Nepticula, Coleophora,* and other leaf miners. Life History, Genetics. Coll. Ex. Sell.

Wilcke, Hermann (Dr.), Kössen/Tyrol Nr. 199. RHOP. MACRO: esp. Noctuidæ, Geometridæ. Coll. Sell.

BELGIUM

Berger, Lucien, 2 Vallée des Artistes, Linkebeek-lez-Bruxelles. LEPID.

*Kiriakoff, S.G., Zoological Labs., Ghent University, 14 Universiteitsstraat, Ghent. RHOP: esp. Belgian Congo. MACRO: esp. Noctuoidea, Thyretidæ. MICRO: esp. Pyralididæ. Phylogeny, Classification. Ex.

Overlaet, Frans G., 9 Chaussée de Louvain, Kortenberg (Brabant). LEPID. Life History, Mimicry. Coll. Ex. Buy. Sell.

CZECHOSLOVAKIA

Cejp, Karel (Prof.Dr.), Botanical Institut, Charles University, Benáská 2, Praha II. LEPID. Entomophytous fungi. Coll. Ex.

Losenicky, Zdeněk, Chválenická 38, Plzen I. RHOP. MACRO. Coll. Ex.

Moucha, Josef, Dusni 6, Praha 1.

Poláček, V.B., ul. Komenského, 601/I., Brandýs nad Labem. RHOP.

Povolný, Dalibor (Dr.), Instit. of Applied Entomology, Brno, Zemědělská 1. LEPID. of central Europe: esp. *Zygæna. Lithocolletis.* Coll. Ex.

Šmelhaus, Jiří, Bělského 4, Praha 7.

DENMARK

Andersen, Axel, Odensegade 7, Ø, Copenhagen. Biology, Distributional Factors. Coll. Ex. Sell.

*Christensen, Georg, Parmagade 24, III, Copenhagen S. RHOP: esp. *Argynnis, Phyciodes, Erebia.* Genetics. Coll. Ex.

Langer, T.W. (Cand. Mag.), Horsholmsvej 77, Rungsted Kyst.

FINLAND

Hackman, Walter (Dr.), Parkgatan 5, Helsingfors. RHOP. and MACRO. of Scandinavia. MICRO of Holarctic region, esp. Coleophoridæ, Gelechiidæ (*Phthorimæa).* Systematics, Distribution. Coll.

Hellman, E.A. (Mr. and Mrs.), Annank. 2F, Helsinki. RHOP: esp. *Pieris, Argynnis, Brenthis.* MACRO: esp. *Acronycta.* MICRO. Coll. Ex. Sell.

Kaisila, Jouko, Zoological Institute of University, P. Rautatiek. 13, Helsinki.

Krogerus, Harry (Dr.), Mannerheimvägen 25A, Helsingfors. LEPID: esp. Tortricidæ, and Canadian fauna. Coll. Ex.

Suomalainen, Esko (Prof.Dr.), Institute of Genetics, The University, P. Rautatiek. 13, Helsinki. LEPID. of Scandinavia. Genetics. Cytology.

FRANCE

Berjot, Etienne E., Villa "Pax", St. Martin de Crau, (Bouches du Rhone). RHOP. MACRO. Life History. Coll. Ex.

Bourgogne, Jean, Muséum d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5^{e}. RHOP. MACRO: esp. Psychidæ (Palæarctic and African). Life History, Morphology, Biology. Coll. Ex.

Dujardin, F., 25 rue Guiglia, Nice (Alpes-Maritimes).

Gaillard, François, 5 Cité du Midi, Paris 18^{e}. RHOP. MACRO. Coll. Ex. Buy.

Herbulot, Claude, 31 Ave. d'Eylau, Paris 16^{e}. MACRO: esp. Geometridæ. Coll. Ex. Buy.

LeCharles, Louis, 22 Avenue des Gobelins, Paris V. RHOP. MACRO: esp. Zygænidæ MICRO: Crambidæ esp. *Crambus.* Biology. Coll. Ex.

deLesse, Hubert, Laboratoire d'Entomologie, 45 bis rue de Buffon, Paris 5^{e}. RHOP: esp. Nymphalidæ, Satyridæ (*Erebia*). Coll. Ex.

Lichy, René (Prof.), 18 rue Voltaire, St. Leu - La Foret (S. et O.). RHOP: Venezuelan only, esp. *Eurema.* MACRO: esp. Sphingidæ of the world. Zoogeography, Ecology. Coll. Ex. Buy.

Muspratt, Vera Molesworth (Mme.), Aïcé Choko St. Jean-de-Luz, Basses Pyrénées. RHOP. MACRO. Life History, Migration. Coll. Ex.

*Stempffer, Henri, 4 rue Saint Antoine, Paris 4^e. RHOP: esp. Lycænidæ (Holarctic and African). Coll. Ex.

Varin, Gilbert, 4 Ave. de Joinville, Joinville-le-Pont (Seine). RHOP: Nymphalidæ, Satyridæ. Subspeciation, Distribution. Coll. Ex.

Viette, Pierre E.L., Muséum Nat. d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5^e. MICRO: esp. Homoneura (Micropterygidæ, Eriocraniidæ, Hepialidæ). ♂ genitalia. Coll. Ex.

GERMANY

Amsel, H.G. (Dr.), (17b) Buchenberg bei Peterzell/Baden.

Busch, Theo (Herr), (22b) Niederadenau, über Adenau/Eifel. RHOP: esp. *Melitæa.* Life History. Coll. Ex.

Cretschmar, Max (Dr.), Casselstr. 21, (20) Celle Hann.

Forster, Walter (Dr.), Menzingerstrasse 67, München 38, (American Zone). RHOP: esp. Lycænidæ. MACRO. Zoogeography. Coll. Ex.

Hering, Erich M. (Prof.Dr.), Berlin N.4, Invalidenstr. 43, Zoologisches Museum. MACRO: Pericopidæ, Zygænidæ, Dioptidæ, etc. MICRO: leaf-miners of all orders. Coll. Ex.

Hesselbarth, Gerhard, (23) Diepholz (Hann.), Hindenburgstr. 13. Palæarctic RHOP. and MACRO: esp. Papilionidæ, Pieridæ, Bombyces, Arctiidæ. Life History, Zoogeography. Coll. Ex.

Jäckh, Eberhard, Haydn Platz 11, Bremen. LEPID: esp. Micros. Life History. Coll. Ex.

Kampf, Ari W., Franz Jurgens Strasse 12, Düsseldorf 10. RHOP. and MACRO: African, esp. *Cymothoe* and *Charaxes.* Coll. Ex. Buy. Sell.

de Lattin, Gustaf J. (Dr.), Geilweilerhof, Post Siebeldingen (22a) über Landau/Pfalz, Forschungsinstitut f. Rebenzüchtung. RHOP: Holarctic, esp. Satyridæ. MACRO: Holarctic, esp. Acronictinæ and Bryophilinæ. MICRO: esp. Palearctic. Distribution, Evolution, Genetics. Coll. Ex.

Reichel, Johannes, Baumholder/Pfalz, Amerik. Personalbüro. RHOP: esp. Papilionidæ. MACRO: esp. Sphingidæ, Saturniidæ, Arctiidæ. MICRO. Life History, Hybridization. Coll. Ex. Buy. Sell.

Speyer, W., (Direktor Dr.), Heikendorf über Kiel 24B, Teichtor 22.

Warnecke, Georg (Landgerichtsdirektor), Hohenzollernring 32, Hamburg-Altona. Palæarctic RHOP. and MACRO: esp. Geometridæ. Migration, Zoogeography. Coll.

HUNGARY

Gozmány, Lancelot A. (Dr.), Széll Kálmán tér. 13, Budapest XII. MICRO. Helophil Moths. Coll. Ex. Sell.

Kovács, L. (Dr.), Budapest XII. Kléh István u 3/a. III. 1.

Lengyel, Julius F. (Dr.), Budapest XII. Budakeszi ut 38. RHOP: of Europe, esp. *Melitæa.* MACRO: Noctuidæ, esp. *Cucullia.* Distribution, Zoogeography. Coll. Ex.

ITALY

Berio, E. (Dr.), Museo di Storia Naturale, Via Brigata Liguria 9, Genova. MACRO: esp. Noctuidæ. Coll. Ex. Buy.

Hartig, Fred (Pr. Count), Sovrint. Istituto Nazionale di Entomologia, Via Catone 34, Rome.

Parodi, Guiseppe, Via Sebenico 13, Milano.

Verity, Roger R. (Dr.), Caldine (Firenze). RHOP: esp. Palearctic. Coll. Ex. Buy.

MALTA

Valletta, Anthony, 257 Msida St. B, B'Kara. RHOP: esp. Satyridæ and Nymphalidæ. MACRO. MICRO. Coll. Ex.

NETHERLANDS

Diakonoff, A. (Dr.), Rijksmuseum van Natuurlijke Historie, Leiden. MICRO: all except Pyralidoidea. Leaf-miners, Biology, Morphology. Coll. Ex. Buy.

Eisner, Curt, Violenweg 7, 's-Gravenhage (The Hague).
Lempke, B.J., Oude Yselstraat 12^{III}, Amsterdam Z-2. RHOP. and MACRO. of Netherlands. Life History.
Roepke, W. (Prof.Dr.), Lab. voor Entomologie, Berg 37, Wageningen. RHOP. and MACRO: esp. Palæarctic and Indomalayan. Life History, Ecology, Genetics, Morphology, Histology, Zoogeography, Systematics.

PORTUGAL

da Silva Cruz, Maria A., Quinta de S. João, Candal, Vila Nova de Gaia. RHOP: esp. *Melitæa.* MACRO: esp. Geometridæ. Migration. Coll. Ex.

SPAIN

Agenjo, Ramon, Instituto Español de Entomología, Palacio del Hipódromo, Madrid. LEPID. of Spain. Coll.
Flores Casas, Hilario, Plaza de Lesseps 17, Barcelona. RHOP. MACRO. Coll. Ex. Buy. Sell.
Torres Sala, Juan, 1 Calle Dr. Romagosa, Valencia. Palearctic RHOP. World Papilionidæ, Nymphalidæ, Morphidæ. Palearctic MACRO. World Saturniidæ, Uraniidæ, Castniidæ. Life History. Coll. Ex. Buy.

SWEDEN

Bryk, Felix, Riksmuseum, Stockholm 50. RHOP. Nervature, Morphology. MACRO.
Nordström, Frithiof (Dr.), Kungsholmstorg 1, Stockholm. MACRO: esp. Agrotidæ, *Eupithecia.* Life History. Coll.

SWITZERLAND

Lüthi, Adrian J., Inneres Sommerhaus, Burgdorf. RHOP. MACRO: esp. Sphingidæ. Coll. Ex. Buy. Sell.
Ruetimeyer, Ernest, 38 Rue Fédérale, Berne. RHOP. and MACRO: esp. Papilionidæ, Pieridæ, Danaidæ, Satyridæ, Noctuidæ. Coll. Ex.

UNITED KINGDOM

ENGLAND

Bowden, S.R., 33 South View, Letchworth, Herts. RHOP.: esp. *Pieris* genetics. Coll. Ex.
Chandless, Richard C., Sherrington Manor, nr. Polegate, Sussex. RHOP. MACRO. Life History. Sell.
Clarke, C.A. (Dr.), "High Close", Thorsway, Caldy, Cheshire.
Fager, Edward W. (Dr.), Bureau of Animal Population, Botanic Garden, High Street, Oxford. RHOP: esp. Theclinæ. Coll. Ex. Buy.
*Ford, E.B. (Dr.), University Museum, Oxford. LEPID. Genetics. Coll.
Hards, Charles H., 40 Riverdale Road, Plumstead, London, S.E. 18. English and American RHOP. and MACRO: esp. *Catocala,* Saturniidæ. Life History, Migration, Distribution, Variation. Coll. Ex.
Heley, Robert G., "Lygoes", Burcott, Wing, Leighton Buzzard, Beds. RHOP: of world, esp. Pieridæ, Nymphalidæ, Papilionidæ. MACRO: esp. Saturniidæ. Distribution, Mimicry. Coll. Ex. Buy. Sell.
Hemming, Francis, 28 Park Village East, Regent's Park, London N.W. 1. RHOP: esp. Palæarctic and Nearctic. Coll. Ex. Buy.
Hinton, H.E., (Dr.), Dept. of Zoology, University of Bristol, Bristol. Phylogeny, Physiology. Coll. (larvæ).
Lisney, A.A. (Dr.), 'Dune Gate', Clarence Road, Dorchester, Dorset. LEPID. Ecology. Coll.
Nevile, H. Ralph, The Rectory (Top Flat), Leire, near Rugby, Warwicks.
*Riley, Norman D., 7 McKay Road, London S.W. 20. RHOP.
Rivers, C.F., Agricultural Research Council, Plant Virus Research Unit, Molteno Institute, Cambridge.
Smith, P. Siviter, 21 Melville Hall, Holly Road, Edgbaston, Birmingham 16. RHOP: esp. *Lycæna.* Coll. Ex. Buy.

Tams, W.H.T., Dept. of Entomology, British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7. MACRO: esp. Lasiocampidæ, Agrotidæ. MICRO: esp. Pyralididæ, Tinæidæ. Life History.
Warren, Brisbane C.S., 3 Augusta Mansions, Folkestone, Kent. RHOP: esp. Satyridæ, Nymphalidæ. Life History, Distribution. Coll.
Williams, C.B. (Dr.), Rothamsted Experimental Station, Harpenden, Herts. Migration, Populations, Ecology. Coll. Ex.

SCOTLAND

Rockingham, N.W. (Lt.Comm.), Lower Seton, North Berwick, East Lothian. RHOP. MACRO. Migration. Coll. Ex.

YUGOSLAVIA

Lorković, Z. (Prof.Dr.), Medical Faculty, Zagrebian University, Zagreb.

LATIN AMERICA

ARGENTINA

Bourquin, Fernando F., Calle Conde 1639, Buenos Aires. LEPID: Life History only. Coll.
Breyer, Alberto, Maipu 267, Buenos Aires. RHOP. and MACRO: Argentine only. Coll.
Hayward, Kenneth J. (Prof.), Miguel Lillo 205, Tucumán. RHOP: Neotropical (esp. Argentine) and Hesperiidæ.
Orfila, Ricardo N. (Dr.), Casilla Correo 2.-Suc.28, Buenos Aires. Neotropical LEPID: esp. Noctuoidea, Tortricoidea. Coll. Ex.
Pastrana, José A., Solis 370, Buenos Aires. MICRO: esp. Pyralidoidea, Tortricoidea. Coll. Ex.
Yiboff, León, Amoretti 184, Ciudadela, Buenos Aires.

BRAZIL

d'Almeida, Remualdo F. (Dr.), Rua Viana Junier, 25, Encantado, Rio de Janeiro, D.F. RHOP: esp. Ithomiinæ, Pieridæ, Papilionidæ. MACRO: esp. Syntomidæ, Arctiidæ, Sphingidæ, Saturnioidea. Biology. Coll. Ex. Buy.
*Araujo, R.L. (Dr.), Instituto Biológico, Caixa Postal 7.119, São Paulo, S.P. MACRO: esp. Castniidæ, Dalceridæ. Coll. Buy.
Cardoso, Aldo (Dr.), Avenida Teresa Cristina 65, Maceió, Alagoas. LEPID. of the world, esp. Saturnioidea. Ex.
Ebert, Heinz (Dr.), Avenida Pasteur 404, Commissão National da Produção Mineral, Rio de Janeiro. RHOP: Theclinæ and Riodinidæ of world; neotropical Limenitinæ, Charaxinæ, Apaturinæ, Satyridæ. Fauna of Brazil. Ex. Buy.
Iserhard F°., Carlos D., Caixa Postal 266, Porto Alegre, Rio Grande do Sul.
Kesselring, Jorge, Caixa Postal 6, João, Pessoa, (Paraíba). RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.
Oiticica F°., José (Dr.), Rua Alfredo Chaves 59, Rio de Janeiro. RHOP. MACRO: esp. Sphingidæ, Saturniidæ. Morphology. Coll. Ex. Buy.
PEARSON, HENRY R., Caixa Postal 5151, Rio de Janeiro. RHOP: esp. Nearctic Papilionidæ. MACRO: esp. Saturniidæ, Sphingidæ, Mimallonidæ. Life History, Food Plants, etc. Coll. Ex. Buy.
Travassos, Lauro (Prof.), Instituto Oswaldo Cruz, Laboratório de Helmintologia, Caixa Postal 926, Rio de Janeiro, D.F. MACRO: esp. Arctiidæ, Adelocephalidæ. Coll. Ex.
Travassos F°., Lauro (Dr.), Dept. of Zoologia, Secr. da Agricultura, Caixa Postal 7172, São Paulo. MACRO: esp. Ctenuchidæ, Pericopidæ, Castniidæ. Life History. Coll. Ex.

BRITISH WEST INDIES

Bellinger, Peter F. (Dr.), University College of the West Indies, Mona, St. Andrew, Jamaica. LEPID. Coloration, Genetics. Coll. Ex.
Lewis, C. Bernard, Science Museum, Institute of Jamaica, Kingston, Jamaica. RHOP: esp. of Jamaica and Cayman Islands. Coll.
Perkins, Lilly G., Sunnybank, Claremont, St. Ann, Jamaica. RHOP. MACRO: esp. Sphingidæ. Sell.

CHILE

Herrera González, José (Prof.), Lo Ovalle 0195, Santiago. RHOP: esp. Pieridæ, Nymphalidæ, Satyridæ. Genitalia, Genetics. Coll. Ex.

CUBA

de la Torre y Callejas, S.L. (Dr.), Universidad de Oriente, Santiago de Cuba, Oriente. RHOP: esp. *Eurema.* Coll. Ex.

MEXICO

Escalante, Tarsicio (Dr.), Av. Cuitlahuac 63, Mexico 17, D.F.

NORTH AMERICA

CANADA

ALBERTA

BOWMAN, KENNETH, 10240 Wadhurst Rd., Edmonton.

Wyatt, Colin W., c/o General Delivery, Banff. RHOP: Palearctic and Nearctic, esp. Alpine and Arctic spp. Local Races. Coll. Ex. Buy. Sell.

BRITISH COLUMBIA

*Fitch, Richard J., 2235 Pandora St., Vancouver. Arctic LEPID. Sell.

*Guppy, Richard, R.R. 1, Marine Drive, Wellington. MACRO. Coll. Ex. Sell.

MANITOBA

Bird, Charles, 1930 Rosser Ave., Brandon. RHOP: esp. Hesperiidæ, Pieridæ. Coll.

Polusny, John, 641 Martin Ave., Winnipeg.

*Quelch, C.S., Transcona. LEPID: esp. Central and S. American. RHOP. Coll. Ex.

NOVA SCOTIA

*Ferguson, Douglas C., Nova Scotia Museum of Science, Halifax. RHOP: Nearctic. MACRO: Nearctic, esp. Geometridæ. Life History, Distribution. Coll. Ex.

ONTARIO

Bailey, Earl G., 34 Tecumseh St., St. Catharines. RHOP. MACRO. Coll. Ex. Sell.

Beirne, Bryan P. (Dr.), Division of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. MACRO. MICRO. Ecology, Distribution Coll. Ex.

*Bruggemann, Paul F., 335 Science Service Bldg., Ottawa. RHOP. MACRO: esp. Geometridæ, Hepialidæ. Life History. Coll. Ex. Buy. Sell.

*Freeman, Thomas N. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP: esp. of Arctic. MACRO. MICRO. Coll. Ex.

*Hardwick, David F., Div. of Entomology, Science Service Bldg., Ottawa. MACRO: esp. Noctuidæ. Coll. Ex.

Harrington, Peter T., 88 Heddington Ave., Toronto. RHOP: Papilionoidea of N. Amer.; Papilionidæ, Danaidæ and Heliconiidæ of world. Coll. Ex. Buy.

Lambert, Robert (Dr.), Dept. of Agriculture, Systematic Entomology, Science Service, Ottawa. MICRO: esp. Tortricidæ. Forest Lepidoptera, Biology. Coll.

McKay, Margaret (Miss), Div. of Entomology, Science Service Bldg., Ottawa. LEPID. larvæ.

*Munroe, E.G. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP. MACRO. MICRO: esp. Pyralididæ and related families. Coll. Ex. Buy.

ROGERSON, JOHN L., 30 First Ave., Coniston. RHOP. Coll. Ex.

Syme, Paul D., 262 Bessborough Drive, Toronto 17. Coll.

*Vogel, Harold A., R.R. #5, London. RHOP. MACRO. Coll. Ex.

Wigmore, R.H., Room 107, Science Service Bldg., Carling Ave., Ottawa. MACRO: esp. Noctuidæ. Coll. Ex.

QUEBEC

*Adelphe, (Rev. Brother), École Supérieure Richard, 200 Rue Galt, Verdun. RHOP: esp. of eastern Canada. MACRO: esp. Noctuidæ of east. Canada. Coll.

*Gray, P.H.H. (Dr.), Box 236, Macdonald College. RHOP. MACRO. Biology. Coll.

*Sheppard, Arthur C., 5554 Coolbrook Ave., Montreal 29. LEPID: of Quebec only. Coll. Ex. Buy. Sell.

SASKATCHEWAN

SHAW, J.P., Box 1056, Weyburn.

UNITED STATES OF AMERICA

ALABAMA

*Chermock, Ralph L. (Dr.), Box 2047, University of Alabama, University. RHOP: esp. Satyridæ. Phylogeny. Coll. Ex. Buy.
Epstein, Hans J., 3 Hazel Hedge Lane, Montgomery 6. RHOP: esp. Papilionidæ, Pieridæ, Nymphalidæ. Coll. Ex. Buy. Sell.

ARIZONA

Wright, William J., Box 86, Cottonwood. Coll. Ex.

CALIFORNIA

Baber, Donald L., 1511 Drake Ave., Burlingame. RHOP: esp. Neotropical Papilionidæ. Variation of *Agrias*. Migration. Coll. Ex.
Baker, Nelson W., 279 Sherwood Drive, Santa Barbara.
*BAUER, WILLIAM R., 235 Liberty St., Petaluma. MACRO. Life History, Collecting Methods. Coll. Ex. Buy.
Blackman, Thomas M., P.O. Box 125, Perris.
Burdick, W.N., 1108 S. Harvard Blvd., Los Angeles 6. RHOP. of Rocky Mts. and West only. Coll. Ex.
*Comstock, John A. (Dr.), P.O. Box 158, Del Mar. LEPID. Life History. Coll.
Coy, L.P. (Dr.), 30 South El Camino Place, San Mateo. RHOP: esp. *Speyeria, Euchloe.* Coll. Ex.
*CRICKMER, NOËL, Borrego Valley, Borrego Springs. LEPID. Coll. Ex.
Damin, Verna A. (Mrs.), 318 Poplar Ave., Modesto.
*Davies, Thomas W., 791 Elsie Ave., San Leandro. RHOP. MACRO. Coll. Ex. Buy. Sell.
*Downey, John C., Zoology Dept., University of Calif., Davis. RHOP: esp. Lycænidæ. Coll. Ex.
Essig, E.O. (Prof.), 112 Agriculture Hall, University of California, Berkeley 4. LEPID: esp. of western North America. Coll.
*Evans, William H., 8711 La Tuna Canyon Road, Sun Valley. LEPID: esp. *Annaphila,* Heliothiinæ, Geometridæ. Life History, Photography. Coll. Sell.
*Ford, Robert J., 3266 Ardmore Ave., South Gate. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.
Gehrhardt, Edgar E., 456 18th St., Richmond 5. RHOP. MACRO: esp. Sphingidæ. Coll. Ex. Buy.
*Guedet, Edward F. (Rev.), 1818 Eddy St., San Francisco15. MACRO: esp. Geometridæ. Coll. Ex. Buy.
*Hammer, William A., 1923 Evergreen Ave., San Leandro. RHOP: esp. *Speyeria, Colias, Œneis.* MACRO: Coll Ex. Buy.
Harlick, Robert M., 2159 33rd Ave., San Francisco 22.
Hill, Charles, 1350 San Luis Rey Drive, Glendale 8. MACRO: esp. Noctuidæ of western Nearctic region. Coll. Ex. Buy.
*Hovanitz, William (Prof.), Dept. of Biology, University of San Francisco, San Francisco 17. RHOP. Genetics.
*Hulbirt, Lowell H., 622 N. Bright Ave., Whittier. RHOP: esp. Lycænidæ, Hesperiidæ. Coll. Ex.
Karp, Ben, 3148 Foothill Blvd., La Crescenta. MICRO. Coll. Ex. Buy. Sell.
*KIRKWOOD, CARL W., Box 47, Summerland. LEPID. Coll. Ex. Buy.
LANGSTON, ROBERT L., 3008 Claremont Ave., Berkeley 5. RHOP. and MACRO. of western Nearctic. MICRO: esp. Zygænoidea. Coll. Ex.
Laspe, Charles G., 1 Middleridge Lane, Rolling Hills. RHOP: esp. Papilionidæ. Coll.
Linsdale, Donald D., Hastings Reservation, Jamesburg Route, Carmel Valley. RHOP. MACRO. Coll.
Macheboeuf, Charles, Kelseyville. Coll. Ex. Buy. Sell.
*McHENRY, PADDY, 1032 E. Santa Anita, Burbank. Original Descriptions of Nearctic Rhop. Coll.
MacNeill, C. Don, Dept. of Entomology, 112 Agriculture Hall, University of California, Berkeley 4.
*MARTIN, LLOYD M., Los Angeles County Museum, Exposition Park, Los Angeles 7. RHOP: esp. *Speyeria, Euphydryas,* Hesperiidæ. Life History. Coll. Ex.
Minahan, Roger P., 8372 E. Westminster Ave., Westminster. LEPID: esp. moths. Ecology, Genetics, Life History, Parasitology.

Monroe, Burt L., Jr., (Ens.), USNR 517599, U.S.S. Bandoeng Strait, (CVE-116), c/o Fleet Postmaster, San Francisco. RHOP. MACRO. Coll. Ex.
Neumann, D., Jr., 3066 Georgia St., Oakland 2.
Opler, Paul A., 415 Beatrice Road, Concord. RHOP: esp. *Speyeria, Papilio.* MACRO. Life History of *Papilio.* Coll. Ex.
PATTERSON, DONALD, 170 Glenwood Ave., Atherton. RHOP. MACRO. Coll.
POWELL, JERRY A., 4170 Bedford Drive, San Diego 16. RHOP: esp. Pieridæ. Coll. Ex. Sell.
Rees, William A., 934 So. McDonnell Ave., Los Angeles 22. MACRO. MICRO. Coll. Ex. Buy. Sell.
Reichart, George B., 5929 Wood Drive, Oakland 11.
*Reid, Robert H., 4442 Franklin Ave., Los Angeles 27. RHOP. MACRO. Coll. Ex.
*Roberds, Joseph, 2022 Huntington Lane, Redondo Beach. RHOP: esp. *Papilio, Speyeria, Colias.* Coll. Ex.
Rubbert, Allen, 1915 Terrace Way, Bakersfield.
Sala, Frank P., 1912 Hilton Drive, Burbank. RHOP. MACRO: esp. Saturniidæ, *Catocala,* Noctuidæ. MICRO: esp. Ægeriidæ, Cossidæ. Life History. Coll. Ex. Sell.
Samuelson, G. Allan, 3824 Walnut Ave., Concord.
Schmela, Dora E. (Mrs.), 2883 Grove St., Ventura. RHOP. Coll.
Smith, Arthur C., P.O. Box 411, Berkeley. RHOP. and MACRO. of Mexico and Southwestern U.S.A. Ecology, Distribution. Coll. Ex. Buy. Sell.
Smoker, Samuel R., 105 Topeka Ave., San Jose, Calif.
*SPERRY, JOHN L., 3260 Redwood Drive, Riverside. RHOP. of world. MACRO: esp. Geometridæ of world. Coll. Ex. Buy.
Stoner, Emerson A., 285 East "L" St., Benicia.
*Thorne, Fred T., 1360 Merritt Drive, El Cajon. RHOP: esp. Theclinæ. Life History. Coll. Ex.
*TILDEN, J.W. (Dr.), 125 Cedar Lane, San Jose 27. RHOP: esp. Hesperiidæ. MICRO. Food Relationships, Behavior. Coll. Ex.
*Weber, Bernie H., 359 E. Angeleno Ave., Burbank. RHOP. Coll. Ex.
Wittman, R.N., Box A, Borrego Springs. Coll.

COLORADO

*Brown, F. Martin, Fountain Valley School, Colorado Springs. RHOP: esp. Pieridæ and Satyridæ of neotropics. Distribution. Coll. Ex. Buy.
*Eff, J. Donald, 820 Grant St., Boulder. RHOP: esp. *Melitæa, Euphydryas,* and Arctic species. Coll. Ex. Sell.
MAY, J.F., Lytle Star Route, Colorado Springs. Large insects of the world. Coll. Ex. Buy.
Marston, Norman L., Hartman. LEPID: esp. Arctiidæ, *Acronycta, Erynnis.* Genitalia. Coll. Ex.
Minor, W.C., P.O. Box 62, Fruita. RHOP: esp. Rocky Mt. fauna. MACRO. Coll. Ex. Buy. Sell.
*Renk, John J. (Brother), Regis College, W. 50th and Lowell Blvd., Denver 11. RHOP: esp. *Catagramma.* Coloration. Coll. Ex. Buy.
Rotger, Bernard (Rev.), Pagosa Springs. RHOP: esp. of Colorado. MACRO. Coll. Ex. Buy. Sell.
Schryver, C.D., 4561 Wolff St., Denver 12. RHOP. Coll. Ex.

CONNECTICUT

Bakeless, John (Dr.), Great Hill, R.D. 2, Seymour. RHOP: Nymphalidæ. Migration. Coll. Ex.
Beall, Geoffrey (Dr.), Dept. of Mathematics, University of Connecticut, Storrs. Migration.
Brower, Lincoln P. & Jane VZ., Osborn Zoological Lab., Yale University, New Haven 11. Biol. of Lepid. Mimicry. Coll.
Carleton, Bukk G., 3rd, Parade Hill Lane, New Canaan.
Hartman, W.D. (Dr.), Peabody Museum of Natural History, Yale University, New Haven 11. RHOP.
*HESSEL, SIDNEY A., Nettleton Hollow Rd., Washington. RHOP. MACRO: esp. *Catocala.* Coll.
Pease, Roger W., Jr., 6 Trumbull St., New Britain. RHOP. MACRO. Coll. Ex.
*Remington, Charles L. (Prof.), Osborn Zoological Lab., Yale University, New Haven 11. LEPID: Genetics, Population Biology, Life History. Coll. Ex. Buy.

*Remington, Jeanne E. (Mrs.), Osborn Zoological Lab., Yale University, New Haven 11.
*Schroeter, Otto H. (Col.), P.O. Box 391, Quaker Hill. RHOP. MACRO. Coll. Ex. Buy. Sell.
*Wilhelm, Herman P., Buckingham Rd., Willimantic. RHOP. MACRO. Coll. Ex. Buy. Sell.

DELAWARE

Jones, Frank Morton (Dr.), 2000 Riverview Ave., Wilmington. LEPID: esp. Psychidæ. Coll. Ex. Buy.

DISTRICT OF COLUMBIA

*CLARK, AUSTIN H., Smithsonian Institution, Washington 25. RHOP.
*Field, William D., Division of Insects, U.S. National Museum, Washington 25. RHOP: esp. Lycænidæ.

FLORIDA

Davidson, W.M., 1504 Bodell St., Orlando. RHOP. MACRO. Coll.
*Fuller, Stanley V., Cassadaga P.O., Volusia County. RHOP. MACRO: esp. Sphingidæ and Catocalinæ. Life History. Coll.
*Grimshawe, Florence M. (Mrs.), 766 N.W. 13th Ave., Miami 35. RHOP. and MACRO. of S. Florida and Keys, esp. *Papilio ponceana.* Coll. Sell.
KILMAN, LEROY N., 2314 59th St. South, St. Petersburg 7.
*KIMBALL, CHARLES P., Route 4, Box 942, Sarasota. LEPID. Chemical Baits. Coll. Ex. Buy.
*King, H.L., Box 1171, Sarasota. RHOP. Coll. Ex.
Stein, George L., 262 Capri Ave., "Silver Shores", Lauderdale-by-the-sea. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.
Sweetman, Harry E., Box 518, DeBary. RHOP. and MACRO: esp. of central northwest U.S.A. Life History. Coll. Ex. Buy. Sell.

GEORGIA

*Harris, Lucien, Jr., P.O. Box 167, Avondale Estates. RHOP. MACRO: esp. *Catocala, Sphinx.* Coll. Ex.
Harris, Lucien, III, 2284 Pembrook Place, Atlanta.
Knudsen, John P., Oglethorpe University, Oglethorpe University.
Sams, Robert, Jr., 172 Huntington Rd., N.W., Atlanta.
*TOWERS, ABNER A., 2421 Sagamore Drive N.W., Atlanta. RHOP. and MACRO: Nearctic only. Coll. Ex.

HAWAII

*Calkins, Virgil F., P.O. Box 461, U.S. Immigration-Naturalization Service, Honolulu 9, Oahu. RHOP: Nearctic. MACRO: esp. Saturniidæ, Sphingidæ, Ceratocampidæ, *Catocala.* Coll. Buy. Sell.
SETTE, OSCAR E., 4490 Aukai Ave., Honolulu, Hawaii, T.H.

IDAHO

Manning, James H., 1515 N. 26th, Boise. RHOP: Nearctic. MACRO: esp. *Catocala,* Sphingidæ. Coll. Ex.
*WILSON, KENT H.,† 823 East "B" St., Moscow. RHOP: esp. Papilionidæ. MACRO: esp. *Catocala.* Jugatæ. Life History. Coll. Ex. Buy.

ILLINOIS

Allyn, Arthur C., Jr., 100 West Monroe St., Chicago.
ANHILGER, CARL, 5938 W. Chicago Ave., Chicago 51. RHOP: esp. *Papilio, Troides* (= *Ornithoptera*), etc. Ex. Buy.
Banks, Leslie, 900 Gunnison St., Chicago 40. RHOP. MACRO: esp. Geometridæ, Heliothiinæ, Notodontidæ. Coll. Ex. Buy.
*BRISTOL, MAURICE L., 511 May St., Elgin. RHOP. MACRO: esp. *Apantesis, Catocala,* Noctuidæ. Coll. Ex. Buy.
Conway, Patrick J., R.R. #3, Box 127, Aledo.

†Life Member.

Dalkoff, Leonard, 1726 29½ St., Rock Island.
Dluhy, Eugene, 3912 N. Hamilton Ave., Chicago 18. LEPID. Coll. Ex. Buy. Sell.
Fryxell, Thomas, 1331 42nd Ave., Rock Island.
FULTON, MACDONALD (Dr.), Dept. of Bacteriology, Loyola School of Medicine, 706 S. Wolcott Ave., Chicago 12. RHOP. Coll.
*Gerhard, W.J., Curator of Insects, Chicago Natural History Museum, Chicago 5. RHOP. MACRO.
*Glenn, Murray O., 1019 Normal St., Henry. MACRO. MICRO: esp. Gelechioidea. Life History. Coll. Ex. Buy.
Hagey, Robert H., 2400 Greenwood Ave., Wilmette. LEPID. Coll.
Hayes, Joseph B., 7522 Forest Preserve Drive, Chicago 34. RHOP: esp. Papilionidæ. MACRO: esp. *Catocala.* Life History. Coll. Ex. Buy. Sell.
Hessler, Robert, 6510 N. Campbell, Chicago 45. RHOP. MACRO. Coll. Ex. Buy.
*Irwin, Roderick R., 411 N. Bloomington St., Streator. RHOP. Coll. Ex. Buy.
Jelinek, Anton, 3900 Diversey Ave., Chicago 47. RHOP: of tropics, esp. *Morpho, Papilio.* Coll. Ex. Buy. Sell.
KISTNER, DAVID H., Dept. of Zoology, University of Chicago, Chicago 37. RHOP: esp. *Speyeria.* MACRO: esp. Noctuidæ. Distribution. Coll. Ex.
*Lauck, Albert G., 2716 Grandview Ave., Alton. RHOP: esp. *Œneis, Erebia, Boloria,* Lycænidæ. Coll. Ex.
LEUSCHNER, RONALD, 1172 S. Wenonah Ave., Oak Park. RHOP: esp. *Speyeria, Boloria, Melitæa.* MACRO. Coll. Ex.
*McElhose, Arthur L., 816 N. Belmont Ave., Arlington Heights. RHOP. MICRO. Coll. Ex.
MERRIAM, ELSEY E. (Miss), 4520 Clarendon Ave., Chicago 40.
Oemick, Donald, 11022 Vernon Ave., Chicago 28. RHOP: esp. *Papilio.* MACRO. Life History. Coll. Ex. Buy. Sell.
*Panske, Leonard G., 2215 W. Eire St., Chicago. RHOP. MACRO. Life History. Coll. Buy.
Phillips, Leonard S., 1928 South Trumbull Avenue, Chicago 23. RHOP. MACRO: esp. *Catocala.* Coll. Ex. Busy. Sell.
Rutkowski, Frank E., 5723 McVicker Ave., Chicago 30. MACRO. Life History. Coll.
Sasko, V.G. (Prof.), 1937 W. Chicago Ave., Chicago 22. RHOP: esp. Papilionidæ, Nymphalidæ, *Morpho* of Western Hemisphere. MACRO: esp. *Sphinx,* Saturniidæ, Lasiocampidæ and smaller moths, *Catocala.* Life History. Ex. Buy. Sell.
*Schoenherr, William H., 225 Cedar Ave., Danville. RHOP: esp. Pieridæ, *Papilio.* MACRO: esp. Sphingidæ. Distribution, Life History. Coll. Ex. Buy. Sell.
SICHER, HARRY (Dr.), Loyola University School of Dentistry, 1757 W. Harrison St., Chicago 12.
Steffen, Michael K., 124 N. Foley Ave., Freeport. RHOP: esp. Nymphalidæ, *Papilio,* Hesperiidæ. MACRO. Aberrations. Coll. Ex. Buy.
Turner, Blair H., 1575 Ashland Ave., Evanston. Nymphalidæ. MICRO. Coll. Ex.
*WOODCOCK, HAROLD E., 6115 Newport Ave,. Chicago 34. LEPID. Coll. Ex. Buy.
*Wyatt, Alex K., 5842 N. Kirby Ave., Chicago 30. RHOP. MACRO: esp. *Eubaphe,* Heliothiinæ. Life History. Coll. Ex.

INDIANA

Ae, Albert S., Dept. of Biology, University of Notre Dame, Notre Dame. RHOP: Genetics.
Badger, F.S., 209 Forest Drive, Kokomo. RHOP. MACRO. Coll.
Chandik, Ted, 1236 119th St., Whiting. MACRO: esp. Sphingidæ, *Catocala,* Saturniidæ. Coll.
Shields, James, 503 West Sixth St., Marion. RHOP: esp. Papilionidea. Coll. Ex. Buy.
Wren, George R., 700 Pierce St., Gary. RHOP: esp. Satyridæ. Mimicry. Coll.
*Young, Frank N. (Prof.), Dept. of Zoology, Indiana University, Bloomington. Extinction of Rhop. by human agencies.

IOWA

Booth, Oliver E., 907 Clinton Ave., Des Moines 13.

KANSAS

Bancroft, Larry, 1023 S. Main, Ottawa. LEPID. Coll. Ex. Buy.
*Ehrlich, Paul R., Dept. of Entomology, University of Kansas, Lawrence. RHOP: Nearctic. MACRO. MICRO. Coll. Ex. Buy. Sell.

Howe, William, 822 E. Eleventh St., Ottawa. RHOP: esp. *Papilio, Troides, Morpho.* MACRO: esp. Sphingidæ, Saturniidæ. Coll. Ex. Buy.
*STALLINGS, DON B., Caldwell. RHOP: esp. *Strymon, Euphydryas, Hesperia, Megathymus.* Racial Distribution, Seasonal Forms. Coll. Ex. Buy.

KENTUCKY

*Bishop, John A. (Dr.), Jeffersontown. RHOP. MACRO. Coll. Ex. Buy. Sell.
*Cook, Carl, Crailhope. RHOP: esp. Papilionidæ of the world. Coll. Ex. Buy. Sell.
MERRITT, JAMES R. (Prof.), School of Law, University of Louisville, Louisville 8. RHOP. Coll. Ex. Buy.
Unseld, James, Jr., Gravel Switch. RHOP: esp. *Papilio, Morpho.* MACRO. Coll. Ex. Buy.

LOUISIANA

Berg, George H., Room 319, Custom House, New Orleans 16. RHOP: esp. Papilionidæ of world. Coll. Ex. Buy.

MAINE

*BROWER, A.E. (Dr.), 5 Hospital St., Augusta. RHOP: esp. of eastern U.S.A. MACRO: esp. *Catocala.* MICRO: esp. Ægeriidæ. Life History, Coll. Ex. Buy. Sell.
*GREY, L. PAUL, R.F.D., Lincoln. RHOP: Argynninæ only. Coll. Ex. Buy. Sell.

MARYLAND

Cross, Frank C., 9413 Second Ave., Silver Spring. RHOP.
Fales, John H., 1917 Elkhart St., Silver Spring. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.
Ghika, George, 3900 Hamilton St., F 101, Hyattsville. Melanism.
MacLeod, Ellis G., Dayton. RHOP: *Colias* of eastern U.S.A.: Taxonomy, Distribution, Biology; Interspecific Hybridization.
*Robinson, Paul F., 425 Barnes St., Bel Air. RHOP. Life History, Physiology. Coll. Buy.
Simmons, Robert S. (Dr.), 1305 Light St., Baltimore 30.

MASSACHUSETTS

*Alexander, Charles P. (Prof.), Fernald Hall, University of Massachusetts, Amherst. Classification, Distribution.
Belcher, Harry C., Jr., 133 Hawthorne St., East Weymouth.
Cady, Michael E., 21 Border St., Dedham. RHOP. MICRO. Coll. Ex. Buy.
*Carpenter, A.J., 236 Huntington Ave., Boston. RHOP. Coll. Buy.
*Coher, Edward I., 12 Harvard Terrace, Allston 34. Coll. Sell.
Cottrell, G.W. (Mrs.), 70 Lake View Ave., Cambridge 38.
Edwards, Robert L. (Dr.), 46 Lincoln St., Waltham 54. Ecology.
Flint, Oliver S. Jr., 57 Farview Way, Amherst. LEPID: Life History.
Hilliard, Stephen S., 25 Beech St., Framingham.
*Johnston, William M., 383 South St., Jamaica Plain. RHOP: of New England. Coll.
Kamp, George W., 44 Holmes Rd., Dedham. Coll. Ex. Buy.
Knowlton, Carroll B., Jr., 14 Stuart St., Everett 49. *Catocala.* Coll.
Lane, Harold E., 41 Ellicott St., Needham. Coll. Buy.
*Learned, Elmer T. (Dr.), 542 Maple St., Fall River. RHOP. MACRO. Genetics.
McCabe, David T., 15 Fiske Rd., Wellesley Hills 82. RHOP: esp. *Colias.* MACRO: esp. *Catocala.* Coll.
Scott, Arthur H., 20 Bishop Pky., Pittsfield. Life History. Coll. Ex. Buy.
Shappirio, David G., Biological Laboratories, Harvard University, Cambridge 38. LEPID. Chemistry of Insect Pigments. Coll.
*Smith, Marion E. (Dr.), Fernald Hall, University of Massachusetts, Amherst. MACRO: esp. Arctiidæ. Life History. Univ. Coll.
WALCOTT, CHARLES, 81 Sparks St., Cambridge 38. MACRO: Saturniidæ. Life History, Photography, Sex Attractants in Moths. Coll. Ex. Buy. Sell.
Williams, Carroll M. (Prof.), Biological Labs., Harvard University, Cambridge 38. RHOP. MACRO: esp. Saturniidæ. Physiology of metamorphosis. Coll. Buy.

MICHIGAN

*Beebe, Ralph, 4169 Tenth St., Ecorse 29. MICRO. Distribution and Food Plants in Michigan. Coll.
Crampton, Charlene E. (Miss), Rt. #1, White Pigeon.

*Dreisbach, Robert R., 301 Helen St., Midland. LEPID. of Michigan. Coll. Ex.
Hodges, Ronald, 1123 Theodore St., Lansing 15.
*Hynes, Vonta P. (Mrs.), 152 Meachem Ave., Battle Creek. LEPID. Life History. Coll. Ex. Buy. Sell.
Lems, Kees, 1319 Hill St., Ann Arbor. RHOP. MACRO. Migration. Coll. Ex.
*McALPINE, WILBUR S., 636 S. Woodward Ave., Birmingham. RHOP: esp. Riodinidæ. MACRO: local. Life History. Coll. Ex. Buy. Sell.
*Newman, John H., 9821 Peer Road, R.F.D. #1, South Lyon. LEPID: of Michigan. Coll. Ex.
*Nielsen, M.C., 1816 Coleman St., Lansing 10. RHOP. MACRO: esp. Sphingidæ, Saturniidæ, Noctuidæ. Coll. Ex.
Perkins, Owen A., 1605 Crooks Rd., Royal Oak. LEPID: esp. of Michigan. Classification, Distribution. Coll. Ex. Buy.
*VOSS, EDWARD G., Dept. of Botany, University of Michigan, Ann Arbor. LEPID. of northern Michigan. Hesperiidæ of world, esp. Classification and Phylogeny. Coll. Ex.
Wagner, Warren H., Jr. (Dr.), 721 Mt. Pleasant Ave., Ann Arbor. RHOP: esp. Hesperiidæ and Lycænidæ. MACRO. Life History. Coll.
Wilson, Bruce V., 815 N. Chipman St., Owosso.

MINNESOTA

COX, SAM M., 127 N. 10th Ave., East, Duluth 5.

MISSISSIPPI

Jones, Jack R., Jr., 304 Robinhood Road, Jackson. MACRO: Sphingidæ, Saturniidæ, Citheroniidæ, *Catocala*.
*MATHER, BRYANT, P.O. Drawer 2131, Jackson. RHOP. Coll.

MISSOURI

Heitzman, John R., 3112 Harris Ave., Independence.
*MEINERS, EDWIN P. (Dr.), 6651 Enright Ave., St. Louis 5. RHOP. MACRO: esp. Arctiidæ. Coll. Ex. Buy.
*Pickel, Benjamin H., 3619 Gordon Ave., Overland 21. RHOP: esp. Theclinæ. Migration. Ex. Buy. Sell.
*REMINGTON, P. SHELDON, 5570 Etzel Ave., St. Louis 12. RHOP: Hesperiidæ, esp. *Megathymus, Hesperia*, Lycænidæ, *Œneis, Erebia.* MACRO: esp. Sphingidæ, Saturniidæ, *Catocala.* Coll. Ex. Buy.
*Thomas, George W., 106 Whitten Hall, Dept. of Entomology, University of Missouri, Columbia. MACRO: esp. Noctuidæ (Plusiinæ). Parasites. Coll. Ex. Buy. Sell.

NEBRASKA

FROEMEL, E.A., Columbus. RHOP. MACRO: esp. *Catocala.* Coll. Ex. Buy.
Johnston, David W., Box 377, Broken Bow.

NEVADA

Dickinson, Krestine M., Box 435, Reno. Life History. Coll. Ex. Buy. Sell.

NEW HAMPSHIRE

*Gerould, John H. (Prof.), 36 Occom Ridge, Hanover. RHOP: Pieridæ, esp. *Colias.* MACRO: esp. *Bombyx.* Genetics, ecology of *Colias.* Anatomy and circulation of *Bombyx.* Mimicry. Coll.
*Lennox, Donald J., R.F.D. #1, Whitefield. RHOP. MACRO. Life History. Coll. Ex.
RITTERBUSH, PHILIP C., 20 Lafayette St., Laconia. RHOP. Life History. Coll. Ex. Buy.
Smith, Richard Stanton, 83 Shore Drive, Laconia. RHOP. Coll. Ex. Buy. Sell.

NEW JERSEY

BOONE, PETER, R.F.D. 3, Box 172, Princeton. MACRO: esp. Sphingidæ, Ceratocampidæ.
*BUCHHOLZ, OTTO, 493 Markthaler Place, Roselle Park. RHOP. MACRO. Coll. Ex. Buy.
CADBURY, JOHN W., III, Spung Hollow, R.D. #1, Pemberton. MACRO: esp. Noctuidæ, Notodontidæ, Sphingidæ. Coll. Ex. Buy. Sell.

Comstock, W.P., 117 Lincoln Ave., Newark 4.
*DOS PASSOS, CYRIL F., Washington Corners, Mendham. RHOP: Satyridæ, esp. *Œneis, Erebia.* Coll. Buy.
Fleming, Henry, Box 84, Coytesville.
Garthe, William, Hanover Road, Hanover. RHOP. MACRO. Life History. Coll. Ex. Buy.
MacGregor, C. Russell (Mr. and Mrs.), Corey Lane, Mendham, Coll. Ex.
MULLER, JOSEPH, R.D. 1, Lebanon. LEPID. of New Jersey only. Life History. Coll.
*RAWSON, GEORGE W. (Dr.), c/o Ciba Pharmaceutical Products, Inc., Summit. RHOP. MACRO. Ecology, Distribution, Biochemistry. Coll. Ex.
Sheldrick, Peter, Mt. Kemble Ave., Morristown.
Small, Gordon B., Jr., 100 Oxford St., Glen Ridge. RHOP: esp. Lycænidæ. MACRO. Coll. Ex.
Treat, Asher E., 51 Colonial Parkway, Dumont. MACRO: esp. *Nemoria, Dichorda.* MICRO: esp. Eucleidæ. Life History.
Zepf, William Wright, 2 Mechanic St., Haddonfield. LEPID. Coll. Ex. Buy. Sell.
Ziegler, J. Benjamin (Dr.), 64 Canoe Brook Parkway, Summit. RHOP: Lycænidæ (esp. Theclinæ), Riodinidæ. Genetics, Ecology, Distribution. Coll. Ex. Buy. Sell.

NEW MEXICO

Eyer, John R. (Dr.), New Mexico Agricultural Experiment Station, State College. MICRO: esp. Lyonetiidæ, Hepialidæ, Micropterygidæ. Morphology, Life History. Coll. Ex.
Standard, O.D., 322 East Coronado Ave., Belen. RHOP: esp. Papilionidæ of world. Coll. Ex. Buy. Sell.

NEW YORK

Beebe, William (Dr.), Zoological Park, New York 60. RHOP. MACRO. Ecology Life History. Coll.
*Bell, Ernest L., 150-17 Roosevelt Ave., Flushing. RHOP: esp. Hesperiidæ.
Bowe, John J. (Dr.), 1303 York Ave., New York City.
Buxbaum, Paul, 360 Central Park West, New York 25. RHOP: esp. Papilionidæ. Coll. Ex. Buy.
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ERRATA IN VOLUMES 5 to 7

Vol. 5: p. 111, right column - delete ", except that students less ... per annum" (included in error).

Vol. 6: p. 13, 12th line from bottom - "Es zuzugeben," should be "Es ist zuzugeben,".

Vol. 6: p. 15, 4th line from bottom - "(M, m, V, v)" should be "(M, m, σ, v)".

Vol. 6: p. 17, 9th line from bottom - "Steilheitendes" should be "Steilheit des".

Vol. 6: p. 18, caption for Abb. 5 - "Tab. II" should be "Tab. I".

Vol. 6: p. 20, top line in Tabelle I - "einbrütig" should be "gen. aest.".

Vol. 6: p. 21, right column, middle - "27 30 0.2" should be "21 30 0.2".

Vol. 6: p. 22, lines 14-15 - "Schwanzlänge (Abb. 8) zeigt" should be "Schwanzlänge. Abb. 8 zeigt".

Vol. 6: p. 22, transpose 6th and 7th lines from bottom, to read "Die oberbayerischen .... alpinen und den fränkischen ...".

Vol. 6: p. 27, 6th line from bottom - "gebrachte bedankengut" should be "gebrachte Gedankengut".

Vol. 7: p. 37 - "*Pieris melete* Mén. 27, 28, 39, 30, 31" should be "*Pieris melete* Mén. 27, 28, 29, 30, 31".

Vol. 7: p. 45, under 3. - "Eriosomatidae" should be "Aphididae"; "'Closeups of Insects'" should be "*Closeups on Insects*".

Vol. 7: p. 60, 7th line from bottom - "168-173" should be "330-331".

Vol. 7: p. 125 - "25. *Lycaeides melissa scudderii*" should be "25. *Lycaeides argyrognomon scudderii*".

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(Complete contents on back cover)

25 June 1954

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Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.,* wing venation, mimicry, moth traps); 2) papers on pre-adult stages, genetics, comparative taxonomy (descriptions of new species and subspecies will be accepted); 3) field notes of more than a very local nature; 4) notes on well-tested techniques. Papers of more than ten pages will not normally be accepted.

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Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors may be charged for the cost of engravings and tables.

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Address editorial correspondence to: Dr. C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U. S. A.

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Address remittances to: Mr. S. A. HESSEL, Nettleton Hollow, Washington, Conn., U. S. A.

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THE LEPIDOPTERISTS' NEWS

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PRESIDENTIAL ADDRESS
TO LOS ANGELES MEETING OF THE LEPIDOPTERISTS' SOCIETY

My dear Colleagues:

I wish that I might be with you — but distance forbids and also a body of unfinished business far greater than would be expected of a man at last retired. My remarks will in a sense be an echo of Dr. JORDAN's of last year, — for I too have long been impressed by the ways in which our Lepidoptera throw light on many a phase of Science.

And firstly, like Dr. JORDAN, I think of the concept of ***species***. "Species" is an entity that has been often and variously defined, and yet with the exception of a few to whom it seems to have no definite meaning, these definitions represent the same conception of Nature: the one I would emphasize is the one also emphasized by HUEBNER, a century and a half ago: he called *species* "Gattung" — "was sich gattet". This is my own definition, and also I think nearest to general acceptation. Those individuals which, under natural conditions, interbreed freely among themselves, and ***not*** freely enough with outsiders to blur the picture, constitute one species. In the Lepidoptera we are as far along as all but a few groups in implementing this idea, through our knowledge of breeding behavior and of crossing in many sample groups. One may cite especially the work of GEROULD and HOVANITZ on the Sulphur Butterflies.

But this problem needs vastly more study, and the Lepidoptera are a fine group to work on it. Consider merely the cases which are sometimes called "Rassenkreise" — where we can follow a species around a large loop, with no sign of sterility or any type of marked break, until we return to the starting place, and find that the two ends no longer breed together; thus what is one species if we go about the circle one way behaves as two at some one place. GOLDSCHMIDT long ago studied a case of this type in the eastern races of the Gypsy Moth, and in that case found the sterilizing factor was a break-down of the machinery of sex-determination, finding that when widely separated populations were crossed intersexes and supersexes appeared, instead of normally sexed individuals. But there are many other cases of such circles in the Lepidoptera calling for study. And in none of them do we yet know the cause of the sterility. I have already noted the case of the Buckeye, and it has attracted some attention though I think no one has experimented with it. In this case *Precis cœnia* and *P. zonalis* meet in southern Florida, Cuba, and the Isle of Pines and behave as two completely distinct species; but in the Southwest and Mexico they appear to

intergrade completely. There is only one possible fact leading to suspicion. In this western blend zone there is a very high percent of melanism, and in some fishes at least such melanism is associated with the physiological disturbance going with semisterility. But so far in the Lepidoptera the very frequent inheritable melanics show no sign of genetic disturbance.

A more useful case making its loop also around the Gulf and Caribbean is the Rattle-box Moth (*Utetheisa ornatrix).* This species shows its blend zone in the West Indies, but in an area from Kansas to Texas behaves as two species. It is multiple-brooded, and I believe from its biology would be much easier to handle for a series of generations than any butterfly; and it also has a very brilliant series of Mendelian characters in color and pattern; but so far no one has seen fit to study it. I can think of no other species which ought to be such a temptation to the geneticist, though we have several other North American Lepidoptera which are worthy of more careful examination. For instance if L. P. GREY is right, *Argynnis atlantis* has two representatives in Manitoba, which must be presumed to intergrade in the far north. This is hardly a fit subject for line-breeding, but intensive collecting in the critical part of Canada might give an answer. Another challenge for more western workers is the relation between *Samia (Platysamia) columbia, S. gloveri,* and *S. euryalus.* Are they three species or even four *(S. nokomis),* or all races of one, and is there perhaps a rassenkreis in the zone where *S. columbia* and *S. gloveri,* or *S. gloveri* and *S. e. kasloensis* meet? This again is a species which can be reared.

So far we have considered patterns that could be put on a map, and speciation as possibly racial (the *Varietät* of STAUDINGER, which I must remind the hearer is not at all the "variety", but the "subspecies" or "race" of American tradition). But there is another side to the problem of speciation. We should assume that really it is a physiological incompatibility that separates species, and it is by no means necessary that physical separation should have come first and incompatibility later. We must take up the suggestion that the physiological barrier came first. Let us consider the accident of cell division called a ***translocation.*** Studies on *Drosophila* and elsewhere show that this is a common accident, and very often leads to a condition where descendants of the translocated individual can breed with each other much more effectively than with the parent stock. So in some cases a translocation leads to a new group of individuals isolated from the parents, and so physiologically an incipient species.

Let us consider what might happen to such a group. It is obvious that at first they would try to mate as freely with the parent stock as with each other, and being semisterile a large part of such matings would be wasted. So we would have a very strong pressure of natural selection, which could go in any of several ways.

1) The entire new stock could be swamped and exterminated by waste matings.

2) Further mutations might take place, which reduce and then eliminate the sterility.

3) There could be some change such as timing of broods, preferred ecology, distinctive mating behavior, or different choice of food, which would eliminate the likelihood of waste matings.

4) Structural changes might occur, making mating uncomfortable or impossible.

5) The new stock could dominate and exterminate the old one in part of its distribution area, presumably in a marginal area. . . then if both stocks should exterminate each other in some intermediate area we would have actual geographical speciation. I personally think this would be an unusual case, and that geographical speciation is on the whole a relatively rare kind, except in island areas or mountain colonies where complete isolation by purely external means might last a long time.

In the first two of these cases obviously we end as we started, with a single species; in the last two we clearly end with two, and *speciation* has taken place.

There is a sixth possiblity in the case of species which mate more than once; namely that the semisterility should go on by further mutation and selection, to complete sterility of the sperm of each species in the passages of the other. This case seems very possible in many mammals, but is likely to be rare in insects. Yet one may well think of the casual mating habits of the Saturniids.

On the whole the Lepidoptera are certainly a group in which this problem can studied very well; in fact we have very many "sibling" or I would prefer to say "twin" species of the type which would be the natural result of this type of speciation. These are closely related species, one pretty obviously directly derived from the other, and separated not geographically but by some point of behavior or ecology which would keep them separate. I may cite the following as a few out of many samples:

Pieris napi in its races and *P. virginiensis* (food, preferred haunt and life cycle)

Phyciodes tharos and *P. batesi* (multiple and single brooded, with hardly any overlap of flight time)

Phyciodes campestris and *P. orseis* (for western biologists to study)

Papilio zolicaon, P. rudkini, and *P. bairdi* (food plants)

Euphydryas chalcedona, E. editha, and *E. anicia* (ecology?)

Halysidota tessellaris and *H. harrisii* (food plants)

Colias eurytheme and *C. philodice* (preferred haunts and normal food); these two are known to be still semisterile.

Erynnis persius, E. lucilius, and *E. baptisiae* (food plants)

Leucania pseudargyria and *L. ursula* (single and double broods)

Semiothisa granitata and *S. sexmaculata* (food?)

Pseudoboarmia umbrosaria and *P. buchholzaria*

Eufidonia notataria and *E. discospilata*

Xanthotype sospeta and *X. urticaria* (flight time).

The phenomenon is by no means limited to the United States; one need only mention the European *Ectropis crepuscularia* and *E. bistortata* or *Colias hyale* and the recently discovered *C. alfacariensis* (*australis*).

These few examples may show how important, types of variation other than racial are likely to prove, and I hope may reduce the "subspecies" category from its present supremacy to its proper position as merely one kind, and not the most tangible kind of variation.

But speciation is far from the only biological problem for which the Lepidoptera are eminently fitted. It is only necessary to mention the work of CARROLL WILLIAMS and his group on the physiology of metamorphosis and diapause, with their relation to hormones in particular. Here the Lepidoptera meet the Bugs on equal terms, and each contributes to the understanding of the other.

And a final field in which I believe the Lepidoptera give us a very important body of knowledge is that of zoogeography, a matter in which I have a little special interest. For this we need to use groups of creatures in which the classification is sufficiently advanced so we know what forms are really related and which merely resemble each other; and there are several groups of Lepidoptera where our knowledge has reached this level. These data will throw light on the migrations of life in the past, and thus indirectly on the history of the Continents. One may mention in particular the pattern of the races and populations of *Pieris napi* and *Papilio machaon,* which when we understand them should give data both on the glacial periods and on the time which it takes to make a species. For in these two complexes we have all levels from the ephemeral field-form to the fully established species. VERITY has also given us a mass of data on the subspeciation of the Palæarctic Melitæas, which will give us further data on the problem when we shall have learned to interpret it.

Another zoogeographical and geological problem is the question of continental shift; if and when the continents have moved, and whether WEGENER'S idea of a gradual series of shifts is more or less sound than the earlier theory of a single great opening of the Atlantic Ocean sometime between the late Permian and the beginning of the Cretaceous ages. I fear that the Lepidoptera will give no data on the main part of this problem, for they are mostly far too young, and the small residue have suffered far too much extinction; but the study which ZEUNER has made of the Bird-Wing Butterflies (*Troides*) shows the type of work which may throw light on the possibility of lesser and somewhat later movements.

So as we go on with the Lepidoptera we are studying the taxonomy, morphology, and biology for our own interest; but we shall also remember the great light they throw on the broader phases of evolution, on physiology, and even on the history of the Earth.

(signed) WILLIAM T. M. FORBES
Comstock Hall, Cornell University, Ithaca, N.Y., U. S. A.

MINUTES OF THE FOURTH ANNUAL MEETINGS OF THE LEPIDOPTERISTS' SOCIETY

The meetings were held Thursday through Saturday, July 2 - 4, 1953, in the Education Room of the Los Angeles County Museum, Los Angeles, California, U. S. A.

On July 2, the time from 9:00 A. M. to 10:30 A. M. was spent in registration of members, and in making reservations for the banquet. Since no officers were present, J. A. COMSTOCK presided in absence of President WM. T. M. FORBES. Upon taking the chair, Dr. COMSTOCK welcomed the members informally. Mr. JEAN DELACOUR, Director of the Museum, gave the formal address of welcome. The presidential address was read by Dr. COMSTOCK for President FORBES; the President's address, the text of which appears elsewhere, provoked a lively discussion. Mr. LLOYD M. MARTIN spoke on the history of the Lepidoptera collection in the Los Angeles County Museum. The nucleus of the collection was formed by Dr. J. A. COMSTOCK in 1928. Subsequent purchases by Mr. ANDREWS added to this material. Later collecting has brought the Lepidoptera to about 250,000 specimens. It is especially strong in southwestern material. There are about 200 specimens of type material. Dr. FRED S. TRUXAL spoke on general entomology in the Los Angeles County Museum.

At 1:30 P. M., following lunch, Dr. TRUXAL showed the members through the new Entomology Hall of the Museum, now under construction. At 3:15 P. M., the Cafeteria kindly served refreshments to the members. At 4:00 P. M., Mr. FRED THORNE read in his absence Professor RALPH W. MACY'S paper entitled "Extending Horizons in the Study of Lepidoptera". At 4:30 P. M., Dr. JOHN BELKIN of the University of California at Los Angeles spoke on "The Teaching of Entomology in the University". After a most spirited discussion the meeting was adjourned for the day by Dr. COMSTOCK.

In the evening, an informal session was held. Mr. MARTIN showed the splendid slides of Papilionidæ loaned for the occasion by A/3c KENT WILSON, with the running narrative that accompanied the slides read by Mr. THORNE; the slides were colored transparencies of insects from the leading museums of Europe. Later a number of slides, the property of the Los Angeles County Museum, were shown; These included life history slides of *Eupackardia calleta* West., habitat views of classic localities in Arizona, and other fine materials. At the end of the showing, the meeting was adjourned.

The meetings of Friday, July 3, were presided over by J. W. TILDEN. The day was given to the presentation of a number of interesting papers. Notes on these papers were taken by Mr. THORNE. Dr. COMSTOCK opened the program with a thoroughly delightful talk on his recent trip to Mexico, which began in November 1952 and lasted for several months; representative species were exhibited, and members gained an excellent idea of the possibilities and difficulties likely to be encountered in Mexico. JOHN S. GARTH presented a paper on butterflies in some of the western United States National Parks, with maps and slides to point up the topography and zonation of these areas; Grand Canyon, Yosemite, Yellowstone, and Glacier National Parks were covered in particular, and representative species were exhibited from each park. RUDOLPH H. MATTONI presented at this time his concept of the genus *Philotes* and related genera; the Palærctic and Nearctic species, their apparent phylogeny, and their distribution were discussed in detail. His summary appears following these minutes. Dr. TILDEN spoke on the history of *Hesperia dodgei* since its description. Lt. Col. STANLEY S. NICHOLAY gave an informal and delightful account of problems connected with finding and collecting various species of the genus *Atrytone,* in Florida, the Dismal Swamp of Virginia, and elsewhere; the range of a species may be considerable, but in many species the colonies are of very limited extent. FRANK P. SALA, unable to appear on Saturday, gave his talk on "The Life History Study of Moths" early, in place of Mr. PADDY MCHENRY. Studies of several years' duration point to remarkable adaptations in diapause. Because of the

full program and the intense interest in the papers, the members voted to dispense with the tour of the Science Section of the Museum. A group picture of members and guests were taken at noon (see figure).

After Mr. SALA'S paper the formal meetings for the day were adjourned. The members and guests met in the evening in La Golondrina Mexican Cafe on Olivera Street, where a delightful dinner and entertainment were enjoyed.

MEMBERS AND GUESTS ATTENDING THE MEETINGS, 3 JULY 1953

From left to right: F. T. THORNE; P. A. ADAMS; J. S. GARTH; W. M. JOHNSTON; J. W. TILDEN; Mrs. TILDEN; C. A. HILL; W. T. MEYER; J. ROBERDS; L. M. MARTIN; R. J. FORD; J. A. COMSTOCK; P. MCHENRY; R. H. T. MATTONI; J. C. DOWNEY.

The meetings of Saturday, July 4, were called to order by the chairman of the day, Mr. FRED THORNE. The theme of the day's session was a symposium, "Collecting in Western North America". Dr. GARTH gave the introductory talk, "Western Life Zones", a keynote of the entire symposium. Mr. THORNE spoke on "Collecting in Southern California". The paper, "Collecting Moths in Central California, by Wm. R. BAUER, was read by Dr. COMSTOCK in Mr. BAUER'S absence; this paper caused a rather long discussion of collecting methods. Dr. TILDEN read a paper on "Collecting in the Sierra Nevada of California". H. A. FREEMAN'S exceptionally fine paper on "Collecting in the Southwest" was read by Mr. THORNE in Mr. FREEMAN'S absence. ROBERT FORD spoke on "Collecting in Southern Arizona"; there was a lively discussion of this paper. It is planned that parts of the Symposium will be published in the *News*. Following the Symposium, a second group picture of members and guests was taken, and then the meeting was adjourned for lunch.

By unanimous vote, Dr. J. A. COMSTOCK was elected chairman of the Business Meeting, which was convened at 1:00 P. M. Since no officers were present, it was agreed that the meeting would be limited to recommendations. Dr. COMSTOCK read letters from Drs. FREDERICK H. RINDGE and CHARLES L. REMINGTON, devoted to recommendations as to procedure. A vote of members in attendance (all from the western States) favored unanimously a yearly West Coast Regional Meeting in addition to the regular Annual Meetings of the Society. The area comprising the Western Region was conceived as including Western Canada, the western States, and Texas.

It was moved, seconded, and passed that the next Annual Meetings of the Society be held east of the Mississippi River, time and location at the discretion of the Society.

It was moved that, in case permission to hold Western Regional Meetings be granted, a program committee for the next year's Regional Meeting be appointed. This motion was seconded and passed unanimously. Mr. THORNE was appointed by Chairman COMSTOCK to this position, his assistants to be appointed by himself.

It was moved, seconded, and passed that Dr. REMINGTON be commended for his untiring work in behalf of the Society.

It was recommended further that the Los Angeles County Museum be thanked formally by the Society for its splendid hospitality. It is suggested also that the Society send a letter of thanks to Mr. JEAN DELACOUR, Director of the Museum.

It was recommended that Mr. THORNE, as Program Chairman, send a letter to Mr. FRANK PETERSON, Manager of the Cafeteria, thanking him for his kindness in supplying afternoon refreshments to the members and guests at no charge.

Following these amenities, the business meeting was adjourned by Dr. COMSTOCK.

After the business meeting, Mr. FRED THORNE resumed duties as the Chairman. Mr. PADDY MCHENRY talked on "Original Descriptions of Nearctic Lepidoptera". In the absence of Mr. H. H. KEIFER, his whimsical and learned paper on "Collecting Microlepidoptera in the West" was read by Dr. COMSTOCK. This author, who has achieved prominence in both Entomology and Acarology, told of the problems in studying the difficult group of Micros here in the West, far from the great collections of these insects. The paper, "Attraction by Virgin Female Moths", was read for A/3c KENT WILSON by Mr. THORNE. The possibilities of both the radiation theory and the odor theory were discussed, and experiments concerning attraction were given. A paper by VERNON M. STERN, "Preoviposition Changes in Female *Colias eurytheme*", was read by Dr. TILDEN. The paper, "Some Field Problems in the Genus *Mitoura*", by O. E. SETTE, was read for him by Lt. Col. NICOLAY in Mr. SETTE'S absence. The possible status of the three described races of *Mitoura siva* was treated from a field point of view, with extensive collections exhibited by Mr. THORNE to complement the paper. Following this paper, a discussion of the several papers took place, and exhibits of insects of more than usual interest were inspected. Reared specimens of the varieties of *Papilio rudkini* were shown, which indicated a possible Mendelian ratio in the occurrence of these forms.

It was agreed that meetings on the following day (Sunday, July 5) were not needed and after much discussion, and compliments to the Program Committee (FRED THORNE, Chairman, and LLOYD M. MARTIN and ROBERT T. FORD), the Meetings were adjourned.

A total of $13.00 was taken in registration fees, and this sum was turned over to Mr. THORNE to help defray the costs of postage and programs.

The following members and guests signed the registration book, in addition to those shown in the photograph: J. N. BELKIN; R. M. CHEW; W. L. LLOYD; S. S. NICOLAY; W. D. PIERCE; R. H. REID, JR.; P. C. RITTERBUSH; A. RUBBERT; T. RUBBERT; Mr. and Mrs. F. P. SALA; F. S. TRUXAL; B. WEBER; L. A. WILSON; R. N. WILSON.

Respectfully submitted,

J. W. TILDEN, Secretary *pro tem.*

(Abstract) TAXONOMY AND DISTRIBUTION IN THE GENUS *PHILOTES*

by Rudolph H. T. Mattoni

1. The genus *Philotes* Scudder is characterized in North America by four distinct types of male genitalia, based on the conformation of the valves.

2. The morphology of the European section of this holarctic genus suggests a phylogenetic relationship of these types.

3. It is suggested that the basic type of valve is of the *Glaucopsyche* - *Phædrotes* type, which is relatively unmodified in the *enoptes* group of *Philotes.*

4. *P. battoides* Behr is a closer relative to the European section of the genus than to *P. enoptes* Bdv., and is probably of more recent origin.

5. The European section of the genus consists of three species which are more closely related to one another than are any of the North American section, except for the four species of the *enoptes* complex.

6. *P. speciosa* H. Edw. is a species of obscure relationships to any members of the subfamily Glaucopsychinæ examined, and may be a relict species.

7. *P. sonorensis* F. & F. is not congeneric with the remainder of the genus as presently conceived, and a new generic name should be erected for all species other than *P. sonorensis* discussed in this paper.

8. *Philotes battoides* Behr and *P. glaucon* Edw. are conspecific, under the name *battoides,* by priority.

9. Parallel evolution in sympatric populations of *P. enoptes* and *P. battoides* in wing pattern convergence may be explained by recombination under selection of common genetic factors.

10. A new arrangement of the "genus" *Philotes* is proposed, but until a more complete investigation of the entire subfamily is undertaken, it must remain a tentative working hypothesis:

Philotes (*Turanana?*)

1. *P. speciosa* H.Edw.: northwestern Mohave Desert, lower San Joaquin Valley, Calif., U. S. A.
2. *P abencerragus* group: Mediterranean region
3. *P. vicrama group*: central Europe to Himalayas
4. *P. baton* group: west and south Europe
5. *P. battoides* group
   - *battoides* Behr: arctic alpine High Sierra
   - *oregonensis* B. & McD.: Pacific northwest
   - *intermedia* B. & McD.: northern California, west side of Sierras
   - *glaucon* Edw.: east side of Sierra Nevada, Modoc to Tulare Co.
   - *bernardino* B. & McD.: southern Sierra, western Mohave to coast, to northern Baja California
   - *centralis* B. & McD.: southern Rockies, Utah, Colorado, no. Arizona.
6. *P. enoptes* group
   - *enoptes* Bdv.: Sierra Nevada, western Nevada, no. Calif.
   - *dammersi* Comst. & Henne: Colorado and Mohave deserts to central Arizona
   - *ancilla* B. & McD.: Rockies, Montana to New Mexico
7. *P. mohave* Wats. & Comst.: central Mohave and Colorado deserts
8. *P. spaldingi* B & McD.: western Rockies
   western Calif. to southeastern Arizona

Div. of Botany, University of California, Los Angeles 24, Calif., U. S. A.

ANNUAL REPORT OF THE EDITOR-IN-CHIEF FOR 1952

With the approval of the Executive Committee, the medium for publication of the *News* was changed from offset printing to letterpress, beginning with the first issue of Volume 6. My proposal for this change was outlined in my last report (see *The Lepidopterists' News,* vol.6: pp.122-123). Among the many advantages of letter-press over offset printing I may mention a few: 1) the more pleasing appearance, with a great variety of type-faces available and better illustrations; 2) a simpler and more satisfying method of preparing reprints for authors; 3) substantially less editorial time; and 4) opportunity for authors to correct proofs of their contributions. The principal drawbacks seem to me to be a somewhat higher cost and less of the desirable informal tone we had with offset printing. The modest increase in dues seems to be supporting the increased costs. Here we have had great aid from the several generous members who have provided from one to fifty dollars, each, for the Illustrations Fund. I am gratified to see that the atmosphere of easy and intelligent participation in the *News* by many members has not been inhibited as I feared. The series of lively discussions of "hilltopping" by butterflies, the many good field notes, the rapid turnover of insertions in the Notices pages all signify this. 41 authors contributed to Vol. 6.

Beginning with Volume 7, we are aiming to publish a number of the *News* for every two months, eventually with precise regularity.

The three Associate Editors of the *News* have carried large portions of the editorial duties. I am most fortunate in being associated with them. Dr. BELLINGER'S move to the University College in Jamaica has fortunately not required him to give up management of the program for abstracting all the world's recent literature on Lepidoptera, a huge program which he has organized thoroughly and for which regional abstractors are gradually being established. You are receiving a separate progress report from the fourth Associate Editor, Mr. BROWN.

Assistance is needed in the form of volunteers to compile a complete species-index for the first five volumes of the *News,* and eventually of the later volumes.

Respectfully submitted,
CHARLES L. REMINGTON

FIRST ANNUAL PACIFIC SLOPE MEETING ANNOUNCED

At the annual Lepidopterists' Society meeting in Los Angeles in 1953, the members in attendance decided to meet each year in the Pacific slope area. Application has been received to hold these meetings under the auspices of The Lepidopterists' Society, since most of the western members find it difficult to attend the annual meetings elsewhere in North America.

In the area west of the continental divide there is a large and active group of lepidopterists. A regional meeting in this area can do much to stimulate interest and foster the work of The Lepidopterists' Society, so action of the Executive Committee is assured for permission to conduct these as regional meetings of the Society. Such regional meetings are not an innovation in scientific societies, and some have been notably successful to the benefit of the parent organizations.

This year the first annual western meeting will be held at the California Academy of Sciences in San Francisco on Sept. 4 and 6 (Labor Day). The program committee consists of Dr. J. W. TILDEN, JOHN DOWNEY, and FRED THORNE. This committee will send program information to the western members well in advance of the meeting.

FRED T. THORNE, 1360 Merritt Drive, El Cajon, Calif., U. S. A.

FLIGHT HABITS OF *ANTHOCARIS*

by William H. Evans

For fourteen years I have lived on a "flyway" of *Anthocaris reakirtii* Edw. in the Verdugo Mountains in Los Angeles County, California, and have been able to make careful observations on the flight habits of this species. From my back yard, which is in the bottom of a steep, narrow canyon that branches off from the north side of La Tuna Canyon at an elevation of 1160 feet and extends back one thousand feet to a ridge of 1475 feet above sea level, I have an unobstructed view of the slopes and ridges which rise to forty feet on the east side and over one hundred feet on the west.

Since *A. reakirtii* males fly up and down this canyon from one to three feet above the lowest part of the canyon floor, most of them pass through my yard — in fact, only about two per cent of all the males observed here have failed to fly through the yard, and these strayed only fifteen or twenty feet up the slope while chasing each other or pursuing females, returning to the vicinity of the dry stream bed a short distance away and continuing their flight either up or down the canyon. I have never seen males fly over the ridges on either side. Apparently they never cross the ridge at the head of the canyon, for those that fly up the canyon always return within five or ten minutes. After leaving the side canyon, they fly along the north side of the main canyon a few feet from the base of the slope. The direction of the wind seems to have no effect on the flight of *A. reakirtii.*

The females frequently fly up and down the slopes and over the ridges as well as in the canyon bottoms. Most of their eggs are laid on species of *Brassica* and other Cruciferæ growing in the lower parts of the canyons; therefore, the greatest number of *A. reakirtii* emerge there, and males have the best chance of finding females by flying up and down the canyons. Since males outnumber females about ten to one, many males never find mates.

These descriptions of flight habits are based on observations of over 1500 *A. reakirtii* males. During my first thirteen years in this canyon, between fifty and one hundred males flew through the yard each spring. Last year (1953) was exceptional: in my yard, between January 21 and March 29, I caught 500 males by using a decoy specimen on my net (*Lepid. News,* vol.6:p.100), and I saw 64 other males and 52 females.

The large late-spring form of *A. sara* Bdv. is not abundant in this canyon; in fact, some years it does not appear at all. *A. sara* males follow the same route through the canyon as *A. reakirtii,* but fly faster and a foot or two higher than the latter, and sometimes cross the ridge at the head of the canyon.

In several other localities I have seen both of these species flying along stream beds and the bases of slopes; however, there is no reason to give details on these places. In the case of these nonmigratory species, careful observations over a period of many years in one locality are more valuable than brief observations in a number of widely scattered areas.

8711 La Tuna Canyon Rd., Sun Valley, Calif., U.S.A.

TECHNIQUE FOR MASS REARING OF *HARRISINA BRILLIANS* (ZYGÆNIDÆ)

by Robert L. Langston

The Western Grape Leaf Skeletonizer, *Harrisina brillians* B. & McD., a dark metallic blue Zygænid moth, is a pest of wild and cultivated grapes in the southwestern United States. To combat this pest, a biological control program was initiated in 1950 by the University of California. Several parasites were found within the range of the host insect in Arizona, New Mexico, and northern Mexico (Smith & Langston, 1953). Two diseases were also discovered, which were diagnosed as caused by a spore-forming bacillus (apparently *Bacillus cereus* Frankland & Frankland), and a granulosis virus (Steinhaus & Hughes, 1952).

To propagate the parasites and for biological experimentation it was necessary to rear large numbers of the Skeletonizer. With the various modifications being omitted, the principal parts of the technique are given as follows:

The first step in mass rearing of the moth is to have sufficient quantities of the host plant — wild and/or domestic grape. From late spring to early fall, wild grape leaves are obtainable from the field. However, if the insects are to be raised continuously, it is necessary to grow grapes in a greenhouse to insure foliage throughout the winter. It is advantageous also to have the young larvæ feed on a living plant rather than a cut "bouquet" of grape leaves. The larvæ are gregarious, feeding side by side (figured by Smith, 1953), but will disperse if the leaves dry up only slightly.

Under the environmental conditions of the greenhouse in La Mesa, San Diego County, California, Thompson Seedless grapevines were superior. They started easily from cuttings and were of a better quality for larval food than Concords, Tokays, or even the wild grape. The rooted cuttings were planted in 10-quart galvanized pails and permitted to grow as much foliage as possible, considering the limitations of time and space, before being subjected to the insects.

Being diurnal insects, the adult moths mate and lay eggs only on bright, sunny days. Therefore, several potted vines are placed in a large, room-like cage with an exposure to the sun throughout the day. The freshly emerged adult moths are added each day to the cage. They usually mate the first day and oviposit on the second. However, once the process is started, and if a steady supply of a few adults a day is available, new vines are added each day. When a sufficient number of eggs are deposited on the leaves, the vines are removed to a greenhouse bench. The number of eggs desired per vine depends upon the size of the vine and if supplementary leaves will be available for the larger larvæ. The larvæ are permitted to feed through the fourth instar on the vines on the benches.

During the fifth instar the larvæ lose their gregarious habit and commence searching for suitable sites for pupation. Before they start wandering, the larvæ are put in cages. The bottom of the cage is lined with removable corrugated cardboard. The larvæ and a fresh grape bouquet are added. The larvæ feed to maturity in the cage. The majority then crawl down into the corrugations of the cardboard and pupate, although a few may pupate in dry leaves or on the sides of the cage.

Diapause occurs in the pupal stage of *H. brillians.* Once diapause begins, a definite time interval is required, regardless of external conditions, before developmental activity is resumed (Smith & Langston, 1953). If diapause does not occur (*e.g.,* from spring or early summer larvæ from the field, or if prevented experimentally), the adults will emerge in a week or so, and the procedure continues in the large oviposition room.

The large oviposition room is necessary for mass rearing where many vines are subjected to a large number of adults. For individual biological or genetic studies (Langston & Smith, 1953), a small vine is placed in a two-foot cubical cage and subjected to one pair of adults. Although the space is much more confined, the female moth will readily oviposit. The resulting larvæ from this egg mass are kept separate for subsequent experimentation.

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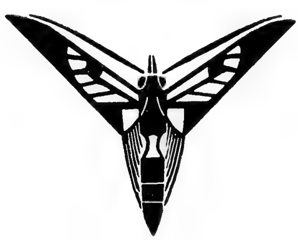
Dept. of Biological Control, University of California, Berkeley 4, Calif., U.S.A.



PHILATELIC LEPIDOPTERA

by MARION E. SMITH

Many entomologists who are also philatelists are collectors of insects on stamps. These include bees and beehives, mosquitoes, dragonflies, a praying mantis, termitaria, and several beetles, but by far the greatest number are butterflies or moths. The recent trend toward the issuing of sets of stamps depicting local fauna and flora has called the attention of the philatelic world to the beauties of these "jewels on wings". The 20-value set just issued by Mozambique, and the four most recent *Pro Juventute* sets of Switzerland, all in full natural color, should do much to interest collectors (of either Lepidoptera or stamps) in this special field. The entomologist may also wonder, somewhat facetiously, perhaps, about the possible consequences of this relatively new source of "publication"!

Fourteen stamp-issuing countries, from 1902 through 1953, have issued a total of ninety-nine stamps of forty-six different designs, showing forty-three species of butterflies, moths, or their caterpillars.

The first butterfly or moth to be used on a postage stamp was a Sphinx moth which appeared on seven Curaçao (type A10), thirty-one Dutch East Indies (A9), and eight Surinam (A10) stamps of 1902-1908. Appearing in the border design, the four outstretched stylized moths attract little attention (except from the entomologist). Their use on these stamps is of no scientific significance, according to the Philatelic Service of The Netherlands, for they were used only to fill up the triangles around the central medallion decoratively.

The Silkworm *(Bombyx mori L.)* has, not surprisingly, been honored philatelically more frequently than any other lepidopterous insect (though less frequently than the honeybee). Lebanon in 1930 issued a set of six stamps (A4) to commemorate the Silk Congress held in Beyrouth that year. Each shows, in fine detail, a silkworm, a silk cocoon, and a moth, on mulberry leaves. Trieste's silkworm stamp (#30, 1950) pictures larvæ (very poorly drawn) and a cocoon on mulberry leaves, but does not show the adult insect. In 1953, Italy issued a single stamp honoring AGASTINO BASSI DER LODI, whose portrait appears on the stamp, with side panels which show silk moths, silkworms on mulberry leaves, and pupæ within cut-open cocoons. It was BASSI who showed (in 1835) that the muscardine disease of silkworms, the cause of enormous losses, is contagious, and is caused by a fungus (later named *Beauveria bassiana* in his honor) which multiplies on and in the body of the insect. This was the first demonstration of an insect disease caused by a micro-organism. The stamp was issued in conjunction with the Sixth International Congress of Microbiology, held in Rome in 1953.

The most beautiful insect stamps yet issued, in my opinion, are those of the *Pro Juventute* sets of Switzerland. The insects are shown in full natural color, and in such superb detail that they can easily be recognized, in most cases, from the stamp alone. All are common European species, most of them widely distributed, and most of them Lepidoptera, although a honeybee, a damselfly (*Agrion splendens* Harris), a lady bettle (*Coccinella septempunctata* L.), and a longhorned beetle (*Purpuricenus koehleri* L.) have been included. An intriguing part of the stamp design is a delicate tracery of leaves in the background—in most cases, the food-plant of the insect. Four of these sets have been issued thus far. They appear annually just prior to the Christmas season, and are used for a limited time only; the revenue (5 to 10 centimes per stamp) which is in excess of regular postage is used for child welfare work. The Lepidoptera are listed below:

1950

10 plus 10 — Red Admiral (*Vanessa atalanta* L.) — Nymphalidæ — with leaves and blossoms of Stinging Nettle (*Urtica dioica* L.).

20 plus 10 — Blue Underwing (*Catocala fraxini* L.) — Phalænidæ — with leaves and catkin of Black Poplar (*Populus nigra* L.).

40 plus 10 — Sulphur Butterfly (*Colias palæno* L., probably race *europomene* O. from the Alps — male) — Pieridæ — with fruit and insect-eaten leaves of Bog Whortleberry (*Vaccinium uliginosum* L.).

1951

20 plus 10 — Black-veined Swallowtail (*Papilio podalirius* L.) — Papilionidæ — with leaves of Mahaleb Cherry (*Prunus mahaleb* L.).

30 plus 10 — Orange-tip (*Anthocaris cardamines* L. — male) — Pieridæ — with flowering plant of *Cardamine pratensis* L., the Cuckoo Flower or Meadow Bittercress.

40 plus 10 — Peacock Moth (*Saturnia pyri* Schiffr.) — Saturniidæ — with leaves of Pear (*Pyrus communis* L.).

1952

20 plus 10 — Marbled White or Barred-wing Butterfly (*Melanargia galathea* L.) — Satyridæ — with Couch or Quack Grass (*Agropyron repens* L.).

30 plus 10 — Silver-gray Argus or Chalk-hill Blue (*Lysandra coridon* Poda — ♂ — Lycænidæ — with flowering sprig of Vetch. (This is reported by the Swiss Philatelic Agency to be Crown Vetch, *Coronilla vaginalis* Lam., although it seems to resemble more closely Horse-shoe Vetch, *Hippocrepis comosa* L., a favorite food-plant.)

40 plus 10 — Oak Eggar (*Lasiocampa quercus* L.) — Lasiocampidæ — with leaves and acorn of White Oak (*Quercus Robur* L.).

1953

10 plus 10 — Nun Moth (*Lymantria monacha* L.) — Lymantriidæ — with needles and cone of Scotch Pine *(Pinus sylvestris* L.).

20 plus 10 — Mourning Cloak or Camberwell Beauty *(Nymphalis antiopa* L.) — Nymphalidæ — with leaves of Birch *(Betula* species, probably *B. pendula).*

Mozambique in 1953 issued a set of twenty stamps showing butterflies and moths, the most extensive single set of insect stamps yet issued. Included are nine butterflies and eleven moths of Western Africa, shown in fairly accurate natural colors, each bearing the scientific name of the insect. They are:

10 c — *Papilio demodocus* Esp. — Papilionidæ
15 c — *Amphicallia thelwalli* Drc. — Arctiidæ
20 c — *Euxanthe wakefieldi* Ward — Nymphalidæ
30 c — *Axiocerces harpax* F. — Lycænidæ
40 c — *Teracolus omphale* Godt. — Pieridæ
50 c — *Papilio dardanus tibullus* Kby. — Papilionidæ
80 c — *Nudaurelia hersilia dido* M. & W. — Saturniidæ
$ 1.00 — *Argema mimosæ* Bdv. — Saturniidæ
$ 1.50 — *Papilio antheus evombaroides* Eim. — Papilionidæ
$ 2.00 — *Athletes* (labelled as *ethra* Westw., an evident misspelling for *ethica* Westw., but more closely resembling Seitz's description of *semialba* Sonth.)
$ 2.30 — *Danaus chrysippus* L. — Danaidæ
$ 2.50 — *Papilio phorcas ansorgei* Rtsch. — Papilionidæ
$ 3.00 — *Arniocera ericata* Btlr. — Zygænidæ
$ 4.00 — *Pseudamphelia appollinaris* Bdv. — Saturniidæ
$ 4.50 — *Egybolis vaillantina* Stoll. — Phalænidæ
$ 5.00 — *Metarctia lateritia* H.S. — Syntomidæ
$ 6.00 — *Xanthospilopteryx mozambica* Mab. — Agaristidæ
$ 7.50 — *Nyctemera leuconoe* Hpffr. — Arctiidæ
$10.00 — *Charaxes azota* Hew. — Nymphalidæ
$20.00 — *Ægocera fervida* Wlk. — Agaristidæ

The Swallowtail and Birdwing butterflies of the family Papilionidæ have, naturally, appeared frequently on stamps. The first was Sarawak's 1950 stamp (#180) showing Brooke's Birdwing (*Troides brookeana* Wallace), which was named by the great naturalist-explorer in honor of Captain Brooke, brother of the White Rajah of Sarawak. The black-and-white reproduction scarcely does justice to this huge strikingly-colored green and velvety-black insect. In 1953, the Republic of Maluku Selatan, in the Moluccas, heart of the Birdwing empire, issued six stamps in gaudy (but not too accurate) natural colors, featuring butterflies of this family. Although the names of the insects have not been officially announced, a check with Seitz's *Macrolepidoptera* identifies them tentatively as four Birdwings: *Troides* (or

"Ornithoptera") brookeana Wall., *T. priamus* probably *poseidon* Dbl., *T. hypolitus* Cram., and *T. priamus crœsus* Wall. or *T. p. lydius* Fldr.; and two Swallowtails: *Papilio memnon venusia* Seitz and *P. ulysses telegonus* Fldr. The 1953 Mozambique set discussed above includes four of the more than one hundred swallowtails known from Africa, and late in 1935 Spanish Guinea issued two stamps showing another well-known African swallowtail, *Papilio antimachus* Dru., one of the largest of all known butterflies.

The *Morpho* butterflies of the New World are represented on only one stamp, issued in 1953 by British Honduras. Called only a "Blue Butterfly", it is perhaps *Morpho peleides hyacinthus* Btlr., which occurs there.

In 1948, Chile issued a set of twenty-five stamps in each of three values, commemorating the 100th anniversary of the appearance of Claude Gay's monumental work on the "Historia física y politica de Chile". Among the animals and plants depicted are a Praying Mantis *(Mantis gayi)*, a stag beetle *(Chiosagnathus grantii)*, and a moth *(Castnia eudesmia* Gray) of the family Castniidæ. This is a day-flying, flower-feeding moth, most active in brightest sunshine. It is said to be difficult to catch, and when caught, struggles violently, scratching severely with strong tibial spurs.

Rather surprisingly, the only stamp known to me which shows a butterfly which cannot be identified is a semi-postal of The Netherlands (B223, 1950) which shows a child gazing at a flying butterfly. It is to be assumed, of course, that the child is an embryo lepidopterist.

For less than ten dollars, the collector can assemble a colorful collection of all the Lepidoptera of the world — that is, all species that have been portrayed on stamps. Most of them can be obtained from any stamp dealer, particularly one who specialized in topical stamps.

This is a contribution from the Department of Entomology, University of Massachusetts.

Fernald Hall, University of Massachusetts, Amherst, Mass., U. S. A.

MIGRATIONS OF *VANESSA CARDUI,* THE PAINTED LADY BUTTERFLY, THROUGH UTAH

by GEORGE F. KNOWLTON

For almost as long as the writer can remember anything about Utah insects, he recalls *Vanessa cardui* (Linné). He took its spring flights for granted. He, like so many others in Utah, saw migratory flights northward in spring, watched the adults "blow along" the highways and fields, and assumed that anything about this insect was very common knowledge. Rarely were notes of movements made by him until entomologists wrote for information concerning the movements after they occasionally were reported to the "Insect Pest Survey." Recently he wrote Mr. KELVIN DORWARD, In Charge, Economic Insect Detection and Reporting Section, U. S. Bureau of Entomology and Plant Quarantine, who promptly sent the report sheets dealing with this insect which had been submitted over the years. The following annotations are from the writer's notes, plus a few others where so indicated:

1931: *V. cardui* was in outbreak numbers in Cache County, South of Logan, during 1931. Larvae moved "like an army" from a pasture heavily infested with thistles which had been largely eaten off before the larvae moved to damage nearby fields of beets, alfalfa and other crops. Flights of adults had been noted through northern Utah during the Spring.

1932: Adult collected at Sandy, June 28.

1933: The first adult was observed near Brigham City on April 18.

1935: This was a year of large spring migrations through Utah. E. W. DAVIS, with no indication of locality on the note, stated that "On May 1 a migration of the painted lady, *Vanessa cardui* (Linn.), occurred. These butterflies were all flying in a northerly direction. At one place the car was stopped and 100 feet were stepped off and the number of butterflies crossing the road was counted. It was found that 200 crossed the road in 5 minutes in 100 feet of road. This occurred at 9:30 a.m.; air temperature 68°; soil temperature 98°. Specimens were sent to Washington for identification."

On May 3, 1935, the following appeared in *The Salt Lake Tribune*: "Eureka was treated to a rare and freakish phenomenon on Wednesday, when a windstorm of butterflies, literally millions of them, flew through this city, using Main street as a passageway. The insects started their journey through Eureka about 10 a.m., coming from the west and traveling eastward toward Utah county. The flight was not steady, but at intervals of about every 15 minutes the air was filled with butterflies, the effect resembling an autumn day when the wind is whirling the leaves about in great confusion. The migration continued until about noon, when the atmosphere began to clear. Where the butterflies came from and where they were going is a matter of conjecture, which the people of this district would like to have made clear."

On May 6, the same paper recorded the following: "A migration of millions of butterflies, believed to have been the same myriads seen flying through Eureka a few days ago, passed through Provo Sunday afternoon. Captain James C. Snow, veteran member of the Provo city police department who was one of the first to notice the rare phenomenon, recalled that he had once before witnessed such a windstorm of butterflies approximately 40 years ago. At that time, the butterflies swarmed through the city traveling in the same direction, north-easterly, but were of a larger and much different variety, he said. The butterflies seen Sunday seemed to be of a dark brown variety." These movements extended on north through Box Elder and Cache Counties, and into Idaho.

On May 16, 1935, a letter was received from a county agent, S. R. BOSWELL of Provo, who reported the following: "The last ten days we have had a continuous stream of butterflies and moths through this valley (Utah Valley) going northward and they continue to go. I have heard recently that they have been in the western part of the state as well as the eastern. I am wondering if you could explain what these are." On the same day another letter was received at my office from S. W. WINTER of Ogden with the following statement: "Last week an extensive flight of reddish-colored butterflies was reported traveling north. While I did not see them personally to get you any specimens, I wonder if you know what these were and if they are an injurious species."

Migrations of *V. cardui* were repeatedly observed in northern and central Utah upon numerous occasions, and reported from southern Utah during the first three weeks of May, and even earlier. Inquiries concerning the flight and reports of the movements were received at my office from Provo, Ogden, Richfield, St. George, and Garland. Northward and westward movements of large numbers of the adults were repeatedly observed in various parts of Box Elder, Weber, Davis, Tooele and Salt Lake Counties. On June 11, 1935, *V. cardui* caterpillars collected at Kaysville were damaging sugar beets. These damaged hollyhock and defoliated round-leaf mallow. They also were reported to be abundant and causing some damage at Salina. On June 17, *V. cardui* larvae were reported by several county agents to be abundant upon round-leaved mallow, burdock, and other weeds over much of Utah. When these weeds were destroyed or consumed, the larvae often damaged nearby crops.

1937: On May 18, a *V. cardui* flew into the writer's car at Richmond in northern Utah. This was the first specimen he had observed that spring. Later the same day another specimen was collected at Nibley in Cache County.

1940: Four Painted Lady butterflies were in flight, crossing the highway north of Lynndyl, towards the northeast on April 26. A few others were observed later that day. On April 29, from 30 to 50 *V. cardui* flew past F. C. HARMSTON, traveling northeast with the breeze, at a place 15 miles east of Robinson Ranch. This locality is in Utah, but is northeast of Baker, Nevada. On May 3, the butterflies were feeding at black currant blossoms at Utah Hot Springs. On May 17, approximately 15 *V. cardui* were observed flying northward, through an area west of Johnston. This occurred through a sagebrush, shadscale, semi-desert range area.

1941: On April 24, a light migration of *V. cardui* was encountered flying across the semi-desert between St. George and Hurricane. The flight was in a north to northeasterly direction, and the butterflies were observed in flight every little way while driving across a 15 to 20 mile strip, between 2 and 3 p.m. This butterfly also was migrating north through the Cedar City area on April 26. On May 29, a fairly heavy migration of *V. cardui* was encountered between Vernal and Duchesne. Forty-five flying specimens were counted as the car traveled 1 mile at 45 miles per hour, the flight being in a northeasterly direction. On April 30, *V. cardui* was observed in migration at Vernal and in the Ouray Valley of the Uintah Basin. Also, a large migration was encountered, being present from west of Salt Lake City to Grantsville. This flight was heavy in spots and seldom with skips of more than a few rods, over most of the 35 miles traveled between 1 and 4:10 p.m. Flight was in a north by north-easterly direction, except in one spot where a change in wind upset the flight in a small area. Migration also was noted at Verdure, Tooele, Erda, and Lincoln in Tooele County, and at Salt Lake City and at the Airport west of Salt Lake City. Apparently this was the same movement which had been reported from southern Utah several days earlier.

On May 1, *V. cardui* was migrating throughout the day through Utah County, headed north. They were observed during the day at Alpine, Provo, Orem, the flats north of American Fork and Lehi, from Lehi to Saratoga, and in movement across the various highways. On May 2 forenoon, a few migrating butterflies were observed at Logan. The flight increased to large numbers flying north across the town and foot-

hills of Logan and vicinity by late afternoon. The migration also was heavy through Cove and Richmond in Cache County. On May 3, the migration continued through Cove, Lewiston, Richmond, and Smithfield in Cache County, being heaviest at Smithfield. Smaller numbers were present in North Logan and Logan. On May 4, butterflies migrated northward through Ogden and Riverdale in Weber County, and a few were observed at Logan between showers. On May 5, a heavy migration was noted from Soldier Summit to Price, Carbon County, being conspicuous in some high canyon areas. Flight as usual was toward the north. Migration was also found, but of a smaller flight, at Logan in Cache County, at Perry, Willard, and in larger numbers at Brigham, in Box Elder County, also in progress at Hooper, Ogden, North Ogden, and Pleasant View in Weber County. On May 6, the butterfly was observed feeding on the nectar of alfilaria *(Erodium cicutarium)* at Lookout Pass, 6 miles west of Vernon, Tooele County. There was an average of approximately three adults per square yard feeding on these blossoms over an area of about 4 acres. A few butterflies also were observed migrating north. On May 7, migration of *V. cardui* still was in progress through Logan, Mendon and Wellsville in Cache County.

Painted Lady migration continued in northern Utah on May 8. Most of the flight was north by northeast, the flight being heaviest near Corinne, Brigham, Perry, and Willard in Box Elder County, and through Riverdale in Weber County. Numerous adults in flight also were seen near Logan, Benson, Cache Junction, Beaver Dam, Fielding, Collinston, Garland, Tremonton, Bear River City, Harrisville, Farr West, Ogden, Pleasant Grove, Lehi, and Provo. Migration was less active on May 10 than during the two preceding days in Utah, Salt Lake, Davis, and Weber Counties The Thistle Butterfly was very abundant at Wales, Chester, Manti and Moroni in Sanpete County on May 20. No conspicuous migrations had been observed for several days. On May 21, butterflies were quite abundant in Sanpete, Juab, Wasatch, and Summit Counties. At higher altitudes and through some mountain passes, small numbers still were migrating toward the north. However most of them seemed to be settled where they were found. Inquiries concerning the large migration of these butterflies had been received almost daily throughout the period of movement. A large migration was observed through Provo to Pleasant Grove on May 26, coming largely from the west. A heavy migration also was observed from the Duchesne area to Price on May 28, flight being most numerous through the range and desert areas. Movement usually was in a north-easterly direction. On May 29, a heavy migration was in progress from Price to Castle Dale. Large numbers were observed to be congregating around puddles on the roadside.

On June 3, one-half grown Thistle Butterfly larvae had moved from thistle to attack peas in a field at Springdale. Caterpillars also were very abundant on thistle, and some on round-leaf mallow and sunflowers at North Ogden and Clearfield on June 11. Here again, some larvae had moved to feed on peas. Larvae had heavily attacked round-leaf mallow and cockle burr growing in some pea fields at Corinne, Provo, Springville, and Pleasant Grove, by June 14. Some larvae left weeds and moved to peas. On June 13, larvae were very abundant on Canada thistle in one pasture at Heber. Butterflies were abundant in many northern Utah localities at this time. On June 14, the butterflies were numerous in many northern Utah localities and in Washington County in the south-western part of the state. Thistle Butterfly larvae were feeding on hollyhock foliage at Logan and Salt Lake City on July 16, causing some damage. These were found to be riddling hollyhock foliage in a garden at Vernal and at Myton on July 18. Painted Lady butterflies were abundant at Deweyville in Box Elder County on August 12.

1942: A light migration of the Painted Lady Butterfly was encountered moving north through Vernon Creek Canyon across Boulder Pass and south nearly to Tintic Junction, mostly in Tooele County, during June.

1944: Small numbers were noted in migration north at Logan, May 10 and 11, and at Fillmore on May 12. Nearly full-grown larvae were found on thistle at

Minersville, May 15, indicating that the butterflies had reached there earlier. During June, *V. cardui* larvae were found in moderate abundance in a few areas on weeds, and on hollyhock. The adult migration was light and apparently spotted during 1944, so far as the writer was able to observe.

1945: The butterflies were noted moving in considerable numbers in parts of Box Elder County on April 22 and were also observed in Cache County on April 23, in moderate numbers. Most were in flight northward in both areas, but some were feeding on dandelion blossoms in Cache County.

1946: On April 11, a migration was seen in the area between Salt Lake City and Farmington. This migration, while not so large as some noted during the previous season, was very definite. The butterflies were moving from the southwest toward the northeast.

1949: On April 28, butterflies were observed migrating northward in the general areas of Brigham City, Willard, Provo, Ephraim, Richfield, McCornick, Lynndyl, north of Lynndyl about 15 miles, Pleasant Grove, American Fork, "Point of the Mountain" in Salt Lake County, and Draper. This movement had been observed on warm days for approximately ten days. They still were numerous along the highway, bands migrating northward being observed repeatedly between Lewiston and Murray on May 1. An unusally numerous and extended migration was in progress that spring. The migration still was occurring on May 3 and still was quite conspicuous to many people. Larvae of this species were becoming rather numerous by this time in many localities. Adults were still present, and some still in northward flight from May 9 to 11 at Farmington, Logan, Lehi, Springville, Spanish Fork Canyon, Moab, Indian Creek, Greenriver, Monticello, Blanding, Price and Provo. By June 1 many crops were being damaged throughout Davis County by Painted Lady Butterfly larvae which moved from pastures and roadsides in great numbers into beets, potatoes, etc. Much worry occurred on the part of farmers due to this situation which followed the very extensive Painted Lady Butterfly movement throughout most of Utah. By July 11, larvae of these butterflies had moved from thistle and mallow to damage large numbers of home gardens in other localities. These larvae were more numerous and damaging than they had been for a number of years, home owners reported.

1952: The Thistle Butterflies were numerous on dandelion blossoms at Logan by April 22 to 24. By May 11 there appeared to be a substantial northward migration, particularly apparent on two warm days during the week of May 4. By May 14, the northward migration had become very large. Many laymen noted these butterflies and asked about them, referring to their flight and great numbers. A very heavy flight which went through Richfield on May 23 was reported to me by a number of citizens. The movement had been going on to a lesser extent for several weeks. The very large migration still was in progress on May 26, throughout northern Utah, and reports that the migration was still occurring in central and southern Utah were received almost daily at my office. I received five phone calls at my home at Logan on May 25, inquiring what the butterfly was "which was migrating north through Cache Valley by the thousands." This certainly was a year of extremely heavy and long-sustained migration and population build-up of this species. The population and movement in Cache County seemed to be the highest to date for the season in late May. Again a very heavy flight of moths moving northward was repeatedly encountered as I drove from Logan to Delta on May 27. Heaviest flight was observed through Utah County, where three newspaper reporters got in touch with me immediately when I stopped at the county agricultural agent's office. Information on the flight was given and pictures were taken. Central Utah people reported an extremely heavy movement through Utah County on the 26th, even heavier than the one they were experiencing on the 27th, several indicated. A very heavy flight also was noted in Juab County, particularly concentrated at Eureka, Silver City, and Mammoth, on May 27, and this again was reported to have been much heavier on the 26th. This certainly was one of the largest flights of this butterfly which had come through Utah in many years.

A heavy migration through Tooele and Benmore, Tooele County, was in progress May 28 to June 2. This movement still was in progress northward through Cache and Box Elder Counties and into Idaho on June 2. By June 5, larvae in several localities had moved from thistle to gardens, alfalfa, and clover. Some damage was done to gardens at Cove in northern Utah, but no damage was noted to the legumes. On June 28, thistles were heavily attacked by these larvae in several parts of Juab County. By July 8 larvae had been found on thistle and mallow throughout the state. However, less economic damage from this larva occurred than had been anticipated from the unusually large population which migrated through Utah for more than a month during the spring of 1952. In a number of instances larvae were noted attacking hollyhock during July at Logan, Garden City, Provo, Layton, and in other localities.

SUPPLEMENT

Upon inquiring further of Mr. DORWARD for any 1945 Arizona records which I might have sent in, I received the following records for *V. cardui* movements in various western states other than Utah:

ARIZONA:

Reported by V. L. WILDERMUTH on June 16, 1924 — In the June first number of the *Insect Pest Survey Bulletin,* 4: p. 3, "I notice with considerable interest Mr. E. A. McGregor's description of migration of the painted lady butterfly *(Vanessa cardui L.).* It will be of interest to place upon record the fact that the flight of this butterfly also occurred through southern Arizona in approximately the same numbers as estimated by Mr. McGregor. For a period of five days following April 8, the air was full of this painted lady at all times. The general direction of flight being northwest. Observations were made at Tempe, Tucson and Yuma, Arizona, and at all three of these places the numbers seemed to be about the same. I was interested in knowing that Mr. McGregor thought that possibly the source of this migration was either the foothills of the Sierras or the Sierras proper. We have been suspicious that the source was somewhere in central Old Mexico. It would, indeed, be interesting to know the exact source of this unusual flight."

Reported by K. B. MCKINNEY, April 1935—"On April 26, on the desert west of Casa Grande several species of unknown desert plants had been destroyed by the larvae of a butterfly believed to be 'The Painted Lady'. The adults were emerging in large numbers and the countryside could be spoken of as 'swarming' with them."

Reported by C. D. LEBERT, May 15, 1941—"Heavy migrations of caterpillars of the painted lady, *Vanessa cardui* Linn., from *Malva* and other weeds into yards in the Phoenix area. Severe defoliation to some ornamentals resulted in many instances, chrysanthemums, *Lantana,* and petunias suffering most. Larvae crawling into and all over houses are very annoying."

Reported by G. F. KNOWLTON, May 8, 1945—"A few thistle butterflies are flying north between Ashford, Seligna, Hyde Park, and farther west in Arizona." Flight of this butterfly was noted in various parts of Arizona that week, from Flagstaff to south of the Gila River, as I visited and inspected various army posts.

CALIFORNIA:

Reported by E. A. MCGREGOR, May 1924—"Continuing from April 11 to 13, inclusive, there was a remarkable migration of the butterfly. All through the day there was a continual flight of these insects. Roughly it was estimated that there was an average of about 300 butterflies per acre at a given moment. The flight direction appeared to be from the southeast to the northwest, and it would seem that the sources of the migration were either the foothills of the Sierras or the Sierras proper. In travelling the flight was not characteristic of butterflies in general, but was of a more steady and purposeful nature. During calm intervals the flight took place on an

average of perhaps 10 or 20 feet altitude, but during periods of windiness the butterflies flew very close to the ground. There appeared to be no attempt toward pairing and the individuals flew well separated—possibly 10 feet apart on an average. It was very noticeable that they all pursued their flight in the same direction. It was rare that individuals were seen to alight on vegetation, but this they did at times.

"The above flight occurred during the warmest period yet experienced this season, temperature maximums ranging from 80 to 88°. The temperature suddenly dropped late on the afternoon of the 13th, accompanied by a chilly wind, and the flight as suddenly terminated. On the 15th the temperature rose again but a gusty wind occurred so that only a very few individuals could be seen migrating. An attempt to estimate the number of individuals comprising this 3-day migration is here presented. The flight was established to be equally dense at Sundland, Porterville, Strathmore, Lindsay, Exeter, Visalia, Woodlake and Lemon Cove. This shows the flight to have been at least 40 miles in width (It no doubt was much wider). The daily duration of the migration was at least 12 hours, or a total for the 3 days of 36 flight hours for any given point.

"Now the rate of travel was estimated at about 12 miles per hour, which would give to the flight a total dispersion length of 432 miles for the 3 days. Within such a zone (40 miles wide by 432 miles long) is contained about 17,280 square miles or 11,051,200 acres. With an estimated occurrence of about 300 butterflies per acre, it is readily computed that at least 3,300,000,000 had passed in the 40-mile-wide zone between Sundland and Lemon Cove. If more data were available regarding the width of the flight, it undoubtedly could be shown that the population of this interesting migratory flight much exceeded the above estimate."

COLORADO:

Reported by G. M. LIST, May 23, 1935—"On May 10 the painted lady butterfly appeared in large numbers in a number of localities in the state. Many reports came in of them being numerous on fruit blossoms. Rainy weather during the past week has reduced their activities but whenever the sun appeared they were out in numbers."

Reported by F. C. HARMSTON, May 23, 1947—"Migration of the thistle butterfly was observed over an area approximately 6 miles wide, May 22, 1947, 6 miles east of Las Animas. Insects migrating northward."

IDAHO:

Reported by C. R. WAKELAND, May 31, 1935 — "Five specimens of a butterfly which has been reported to be quite numerous in Teton County, Idaho, are enclosed. Farmers say that they were so thick that it was difficult to see the hand extended in front of the face. They are only fairly numerous now and I have noted them in flight as far north as Dubois, Idaho. I think this is the same species that defoliated some of the native shrubs in the vicinity of Sandpoint, Idaho, last year, by the larva, which later showed nearly 100% parasites. I shall make observations on the rest of this trip and send you a record of distribution."

Reported by C. R. WAKELAND, June 22, 1935—"The butterfly about which you wrote me in May has been observed to be state-wide in distribution, but in small numbers, excepting the instance in Teton County, already reported."

WYOMING:

Reported by C. L. CORKINS:, July 9, 1935—"The flight of *V. cardui* is now very heavy, they being more abundant than I have ever seen. Some of the flights over the state are like swarms of bees. The preceeding worms did considerable damage, especially to gardens and in Fremont County it was necessary to spray beets on account of them."

Utah State Agricultural College, Logan, Utah, U. S. A.

ACENTROPUS NIVEUS IN MASSACHUSETTS, REMOTE FROM WATER

by ASHER E. TREAT

The schœnobiine moth, *Acentropus niveus* (Olivier), long known and intensively studied in Europe, was first reported in North America by FORBES in 1938. JUDD (1950) has summarized the North American records and has mapped the eight localities in which this species has now been taken. He concludes, with MUNROE (1947), that the insect is probably native and widely distributed. First described as a phryganeid, in 1791, the moth has often been the object of special interest because of its aquatic habits and because of the dimorphism of the females, some of which possess only vestigial wings and are water-dwelling throughout life, while others have wings appreciably longer than those of the males. BERG (1941) and others have made careful biological and ecological studies indicating that there is a single brood per season, adults being in evidence (in Denmark) from late June until early September. Copulation occurs at the water surface. Eggs are laid on the submerged leaves of the food plants, which include *Elodea, Ceratophyllum,* and *Potamogeton.* THORPE (1950) regards the flightless female as perhaps the only insect among either the Lepidoptera or the Trichoptera exhibiting true "plastron respiration", in which a thin film of air, renewable by diffusion from the water is maintained in contact with open spiracles by a system of hydrofuge hairs. The proboscis is vestigial in both sexes, although BERG believes that the males, as least, may use it for the ingestion of water. While occasional specimens have been taken at light, the moths as a rule have been found only in, on, or very near water. The eight localities previously recorded for this species in North America are all in the St. Lawrence drainage basin between the northern shore of Lake Erie and the eastern portion of Quebec, with two records from central New York. The present record is believed to be the first outside that area.

During the summers of 1952 and 1953, moths were collected almost nightly on the southeastern slope of a cobble a half mile southeastward from the village of Tyringham, in southern Berkshire County, Massachusetts, at an elevation of about 1050 feet. During this period, two collections of *Acentropus niveus* were made, one on 25 August, the other on 1 September, 1953. On both occasions the moths appeared in numbers of 100 or more in short grass at the foot of a sheet lighted by a 100-watt "daylight" bulb. The nearest pond, stream, or marsh was approximately half a mile away and accessible to the collecting station only indirectly and by way of rough, strongly sloping, and sparsely wooded land. Both collecting dates came near the end of a prolonged local drought which dried up most of the usually dependable springs in the neighborhood. The night of the first collection was hazy and windless; the temperature was 23° C. and the humidity 48%. The second night was clear and windless with a temperature of 26° C. and humidity of 33%.

The arrival of the moths at the lighted sheet was not observed. It occurred early in the evening, between 9 and 10 P. M. On each occasion, when first seen the insects were either buzzing about in the grass or at rest upon the apron of the sheet, close to the ground. They were never seen in the air nor outside the immediate vicinity of the light, although the area was carefully and repeatedly searched. Active specimens released in midair fell straight to the ground and continued to buzz about as before. Many were collected with forceps; a spoon would have done almost as well. Several vigorously active specimens were placed in a dry, open petri dish; none escaped, although the dish was left uncovered for more than half an hour. In dry dishes the moths would gather in close clusters, clinging together and climbing over each other in an incessant scramble. It was at first supposed that copulation was occurring in these clusters, but close inspection showed no specimens in copula. Each cluster was found to contain one or more ovipositing females, laying their yellowish eggs either singly or in short strings on the only surfaces available other than that of the dish itself — namely the wings, legs, and bodies of other moths. Because it was not realized until later that these were aquatic or semi-aquatic insects, the eggs were not placed in water. They soon became dry and shriveled, so that it was impossible to tell whether or not they had been fertile. Moths left overnight in the laboratory were dead the next morning.

About forty specimens were taken, of which 5 were spread while fresh, the others being papered, put into alcohol, or dissected. Dr. A. B. KLOTS, who kindly identified the pinned specimens, later reported that the papered insects had proved virtually impossible to spread. A pair of the pinned specimens was sent to HAHN W. CAPPS of the U. S. National Museum. The others are in the American Museum of Natural History. Males and females were represented in about equal numbers, all being of the "sharp-winged" form referred to by FORBES and by BERG. VON KENNEL and EGGERS (1933) figure the tympanic organ of the male, which is well developed, and state that in the flightless females this organ is smaller. In the winged females here reported the "Tympanalkessel" did not differ appreciably in size from that of the males, its longest dimension measuring about 400 microns in both sexes.

The occurrence of these insects during dry weather, so far from inhabitable water presents something of a puzzle, especially since none of the moths appeared to be capable of flight at the time of capture. The most likely explanation, in view of the relative inaccessibility of the collecting station and its remoteness from water, would seem to be that the insects were attracted by the light while in flight at a considerable elevation and that by the time of their arrival they had been weakened by fatigue or by desiccation.

The thanks of the author are extended to Dr. KLOTS for identifying the specimens, to Dr. BRYAN P. BEIRNE and to Mr. CAPPS for references to some of the earlier records.

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Dept. of Biology, The City College of New York, New York 31, N. Y., U. S. A.

NEW RECORDS OF RHOPALOCERA FROM SOUTHEASTERN ARIZONA

by OTTILIE D. CHERMOCK

In the course of several years' collecting in and around Tucson, Arizona, the writer and her parents, Mr. and Mrs. C. D. CHENEY, were fortunate in securing several species of butterflies heretofore unrecorded for Arizona. All specimens listed are in the collection of RALPH L. CHERMOCK.

Phoebis agarithe agarithe (Bois.). Single males were taken at Tucson, on August 20, 1943, September 19, 1943, and August 10, 1946. Of two females, one was collected at Sonoita, Santa Cruz County, Arizona, on August 10, 1943, the other at Tucson on September 3, 1943. As all the specimens were in good condition, a small population of this species is very probably established in this region.

Danaus eresimus montezuma (Talbot). One male was taken at Tucson on November 7, 1944.

Euptoieta hegesia hoffmanni (Comstock). One female was collected at Tucson on August 2, 1944.

Eunica monima (Cramer). One male was collected at Tucson on July 28, 1941.

Chiomara asychis (Cramer). One male was taken on the Mount Lemmon Road, Santa Catalina Mts., Pima County, Arizona, on September 29, 1947, at an altitude of 3750 feet. Another male was collected in Madera Canyon, Santa Rita Mts., Santa Cruz County, Arizona, on September 20, 1950, at an altitude of 5800 feet. A female was taken in Tucson, Arizona, on November 11, 1943. Since all specimens were in good condition, the writer feels that this species is probably native, although rare.

Dept. of Biology, University of Alabama, University, Ala., U.S.A.

FIELD AND TECHNIQUE NOTES

TRAP NETS FOR RHOPALOCERA

The use of trap nets seems to be a method of collecting butterflies peculiar to Africa, and is, in fact, the only way in which certain species can be obtained in any numbers.

The nets are usually some two feet in diameter and about three feet in length, and are kept expanded by rings of wire. The top end of the net is closed by a flat piece of net, not bunched up to a point, and is provided with a loop of chord to attach it to a branch of a shrub or other support. The bottom end is open and fitted with strings to anchor it.

The method of employment is to suspend the net in a sunny spot—a sun-lit path through a shady forest is ideal—so that the mouth of the net is a couple of inches above the ground level. The anchor strings are attached to stones, etc. to keep the net from swaying with the wind, and the bait is placed on a large leaf in the centre. The nets are simply suspended and left, being visited from time to time to take out any wanted specimens. Butterflies will crawl under the edge of the net to get at the bait, but do not seem to crawl out again, any attempts at escape being made by flying upwards.

The bait used depends on the species sought for, and may consist of fermenting fruit—bananas, pineapples, etc.—or the dung of some carnivorous animal. Leopard and lion dung are ideal, so is civet cat, and the dung may be mixed with a little decomposing liver. Bad fish is also attractive to some species. Much seems to depend on the state of fermentation or decomposition, the bait has to be at just the right point to be attractive. It will be found that only male butterflies are attracted to dung and carrion, fermenting fruit attracts both sexes. In Africa the Nymphalidæ and Acræidæ are the two families most attracted, and trap nets are probably the only way by which reasonable series of many species of Charaxinæ and Nymphalinæ can be obtained; the former through their swift flight, and the latter through their skulking habits, are very difficult to catch in the ordinary way with a net.

The same type of net can be used as an "assembling" trap for Heterocera, the bait being replaced by a virgin female in a muslin covered box. In countries where "sugar" is attractive (it does not seem to be so in Africa), these nets could also be used with "sugar" as bait, but I would suggest putting it into a muslin covered jar sufficiently deep to prevent the moths attracted reaching it with their proboscides.

D.G. SEVASTOPULO, P.O. Box 401, Kampala, UGANDA

A NEW NORTH AMERICAN RECORD AND A SECOND RARITY

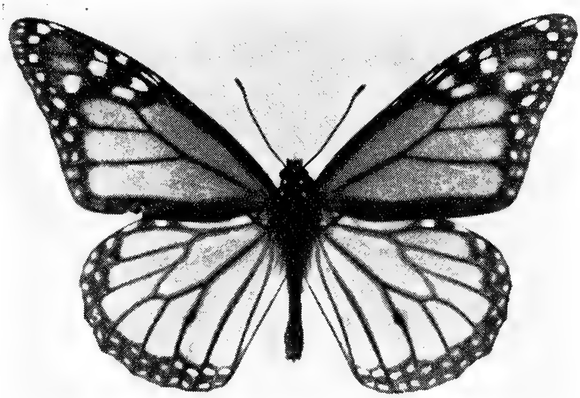
In re-checking some undetermined genitalic slides, one was found which is undoubtedly *Endothenia gentianana* Hübner, the type species of the genus and apparently the first to be taken in North America. It was taken in Wayne County, Michigan, Sept. 11, 1949.

Two other slides, one from Wayne County, June 1, 1951, and Livingston County, May 5, 1951, first thought to be an unknown species of *Eucosma* were recognised as *Grapholithia libertana* Heinrich, which Mr. HEINRICH described from two specimens from British Columbia which KEARFOTT had erroneously included with material of another species.

RALPH BEEBE, 4169 Tenth St., Ecorse 29, Mich., U. S. A.

FIRST *DANAUS PLEXIPPUS* CAUGHT IN JAPAN

One ♂ *Danaus plexippus plexippus* L. was caught by NORIO HOSHIZAKI, then a senior high school student, on a mountain ridge at the north-west corner of Tokyo-Prefecture (alt. ca. 1,670 m.), on 19 August 1950.



The butterfly is in fairly good condition with the scales a little rubbed off evenly, as shown on the accompanying photograph. This is the first and only reliable record of the North American Monarch captured in Japan. The specimen is in HOSHIZAKI'S collection. (Wing-expanse: 88mm.)

TARÔ IWASE, 345 Komachi Kamakura, Kanagawa-Ken, JAPAN

THE FOODPLANT OF *LEGNA PERDITALIS*

What is known about the immature stages of *Legna perditalis* Wlk.? *Cephalanthus* as a food plant for the genus, as given in one reference, appears doubtful for *L. perditalis* in the light of data collected for this species on Long Island, New York.

In March, 1949, two small pupæ were found in the base of the culms of the Woolgrass, *Scirpus cyperinus* (L.) Kunth in a swamp at Greenport. On June 23 a male *Legna perditalis* emerged from each pupa, the same date that the first of this species appeared at light that year.

In August, 1949, a study was made of the clumps of Woolgrass in the swamp, and larvæ were found feeding in the stems. These larvæ pupated in the tunnels in September. The following June *Legna perditalis* imagoes again emerged from these pupæ, which gave clear proof that this species is a borer in sedges and winters in the pupal stage on Long Island.

The work of *Legna* in the Woolgrass resembles that of *Oligia diversicolor* Morr. which feeds in the same sedge but matures and emerges in late summer and early fall of the same year and never winters over in the pupal stage on Long Island.

Generally speaking, except in certain boggy areas where both *Cephalanthus* and Woolgrass are abundant, *L. perditalis* is not a common species on Long Island.

ROY LATHAM, Orient, N.Y., U.S.A.

ON BUTTERFLIES AND CRAB SPIDERS

I was very much interested in E. G. VOSS'S article, "Butterflies and Crab Spiders", which appeared in the last issue of *The Lepidopterists' News,* on page 54. I would like to state a few of my own observations on this subject.

On June 12, 1953, I observed a crab spider capture and kill a specimen of *Papilio glaucus* Linné ♂. The spider which I observed was very well concealed among the blossoms of a lilac bush, and very much resembled the faded flowers, as it was a grayish-white in color. The *P. glaucus* was feeding on the flowers and happened to alight on the particular one in which the spider was concealed. It was immediately seized and paralyzed so quickly that it had no chance to escape. The spider then remained motionless for a few minutes, either resting or watching me, as I had drawn quite close in order to observe it better. It then proceeded to retreat back among the blossoms again, dragging the butterfly with it.

I believe the above stated observation dispels, in part, Mr. VOSS'S theory that perhaps the insects emerge nearby and, as I think he meant, climb the plant on which the spiders were, with fatal results.

Also, I have observed many crab spiders feeding on butterflies in the past few years, and I do not believe that it occurs infrequently. In several cases I also have found the remains of one or two other specimens beneath the plant on which the spider was situated. These were apparently fed upon by the spider and discarded.

To me it seems that these spiders must depend upon some other means other than the flower itself to attract their prey. Consider, for instance, the hundreds of thousands of blossoms that are found in a field of Clover, or the dense stands of Goldenrod, and it seems very probable that this is true, as the chances are one in a thousand of an insect ever alighting on that particular plant. I think that perhaps they have some sort of an odor that is attractive to butterflies. An investigation of these interesting little spiders might well present some interesting discoveries.

PATRICK J. CONWAY, R. R. 3, Box 127, Aledo, Ill., U. S. A.

COLLECTING AMERICA'S MOST BEAUTIFUL HAIRSTREAK

Paging through the plates of Holland's *Butterfly Book* you come across the striking form of *Hypaurotis chrysalus* Edwards (Plate XXIX, Fig. 11). It is listed as the "Colorado Hair Streak" and has a range westward from Colorado to southern California. Its early stages are neglected, and therefore one seeking to obtain this species in the field may find it quite difficult to do so if he is not aware of some of the habits of this butterfly.

On a collecting trip in July, 1952, I was confronted with the fact that my presence in Colorado did not assure me of acquiring this species. I was on the alert but could not find its presence around Denver. Through conversation with Brother J. RENK of Regis College, I found that only in the locality of Tiny Town could this Hairstreak be caught. I therefore made it a point to visit Tiny Town, located in Turkey Creek Canyon.

Collecting methods there will require a large deal of arduous climbing. The one way to be sure of getting *H. chrysalus* is to stir up the scrub oak, which certainly seems to be its food plant and grows in batches along the canyon.

Scrub oak becomes more common around and about Colorado Springs. The flat terrain there enables collectors to obtain specimens with the least exertion. The disturbing of the outer edges of the scrub oak results in scaring up the Hairstreak. Its flight is rapid. It will descend upon some other scrub oak bush, where with cunning pursuit you may snare it. The over-head or drop method will tend to save your net from tearing. The aid of broken branches or stones may also rout the butterfly from the center of the bush.

July seems to be the best month to collect this species.

R. J. JABLONSKI, 1018 East Ogden Ave., Milwaukee 2, Wisc., U.S.A.

THE REACTION OF LEPIDOPTERA AND THEIR LARVÆ TO HOT WEATHER

It is a fact that Lepidoptera and especially larvæ are not killed or even much bothered by the cold. This seems not to be the case with relation to heat.

I used to keep many different species of *Catocala* alive for three to four weeks for the purpose of egg laying. Most of my specimens I catch in bait traps. All the traps are hanging in shady places in the woods. I inspect the traps once and often twice a day. Last season we had a very long, hot, and dry spell, without any change for many weeks. It was at this time that I found all the captured *Catocala* dead in the trap and sometimes lying on their back with only some of their feet moving. Insects caught in traps die surprisingly fast, but they never died in time of eight to ten hours before. The moths were not killed or eaten by other insects or mice, as is usually the case for those dying in the traps. All were in good condition. With all the experience I have, I only can blame the heat for their death.

Also at this time I raised many hundreds of larvæ as: Cecropia, Cynthia, sphinxes, Imperialis, Regalis, and many others. All larvæ were raised up to the pupa stage outside on the trees, bushes or whatever their foodplant may be. The foodplants I enclosed with bags of different sizes. I reared them all successfully, except two species which were the largest larvæ feeding, *Eacles imperialis* and *Citheronia regalis.* In time of about three days I lost fifty per cent of both species. All were full grown about one day before pupation. I found the larvæ on the bottom of the bags either dead or almost dead. This happened at the hottest time of the season. The foodplant was never crowded with too many larvæ, which will sometimes cause diseases or death. The dead larvæ were all in perfect condition. They had no marks of any insect bites or stings, they were not discolored, nor showed any marks of any kind. They just died slowly. Many dead larvæ were successfully inflated for preservation, which is almost impossible with any other diseased or dead larvæ. I have raised many larvæ before, but these things never happened. We also never had a heat wave like this one before.

JOSEPH MULLER, R.D. 1, Lebanon, N. J., U.S.A.

CONCERNING *HEMILEUCA MAIA* IN WISCONSIN

Hemileuca maia (Drury) larvæ were first noticed crossing well-travelled Highway 23 in Marquette Co., Wisconsin, on June 25. Some were in the second and third instars; others were in last stage. The strip of road they were crossing was about one-eighth mile wide, and it ran through a marsh. One side had a heavy growth of Cattails and marsh grass; the other was filled with Alder, Willow, and Tamarack trees. As we were leaving for a collecting trip to Colorado that week, I did not try to collect any of the larvæ, though I had little hopes of finding any when I returned. On July 16 when I returned, my son and I went there and found them still crossing in large numbers. Many were crushed on the road. Most were in last stage. We took one hundred and ten.

In being reared at home they fed on Black Oak. The first larva pupated on July 25. From then on they pupated continually. On September 18 the first *H. maia* adult hatched. The following weekend on September 26 my son and a friend went to the marsh and took twenty. On the 27th we took seventeen. The next weekend, Mr. WILLIAM E. SIEKER of Madison came up; we then netted a total of eight. All these days were very warm, sunny, and dry. About ten of our pupæ have not hatched, by the end of November.

These notes may be of interest to other collectors; several have said they believed *H. maia* was very rare, if it could be found at all in Wisconsin.

RACHEL ELY, Endeavor, Wisc., U.S.A.

OBITUARY NOTES

The deaths of the following members of The Lepidopterists' Society must be sadly reported at this time:

Dr. CARL J. B. BÖRNER, Naumburg/Saale, Germany, on 14 June 1953, at the age of 73 years. He was founder and late Director of the Institute für Phytophathologie of the Deutschen Akademie der Landwirtschaftswissenschaften, Berlin. A distinguished entomologist, he was a leading authority on many groups, including systematics of aphids, Lepidoptera, and Collembola, and at the turn of the Century a pioneer in the study of insect phylogeny. He was author of the recently published Lepidoptera section of Brohmer's *Fauna von Deutschland* and of an important paper, "Die Grundlagen meines Lepidopterensystems" (*Verhandl. VII. int. Kongr. Ent.*, Berlin 2: 1372-1424; 1939).

RAYMOND C. CASSELBERRY, Scarsdale, New York, on 19 April 1954, at the age of 54 years. A prominent amateur lepidopterist and Charter Member of the Society, he recently retired as assistant controller of the General Aniline and Film Corporation, of New York.

PERRY WILBUR FATTIG, Atlanta, Georgia, on 7 December 1953, at the age of 72 years. He was a Charter Member of the Society. He was Curator from 1926 of the Emory University Museum in Atlanta and one of the most successful field entomologists in the United States, specializing almost exclusively in the Georgia fauna. He published eleven important *Bulletins* on Georgia insects, none on Lepidoptera. Before joining the Emory staff, he had been on the faculties of the University of Florida at Gainesville, the State Teachers College at Farmville, Virginia, and the State Teachers College at Valley City, North Dakota. A native of Lancaster, Ohio, he had received the degrees of B. S. and M. S. at Ohio State University. His friend Mr. LUCIEN HARRIS, JR., of Atlanta, provided these notes.

LEROY N. KILMAN, Gulfport, Florida, on 3 April 1954, at the age of about 80 years. An ardent amateur lepidopterist, he retired in 1933 from the U.S. Naturalization Service in Buffalo, New York.

ARTHUR L. McELHOSE, a Charter Member of the Society, on 4 March 1954 at Arlington Heights, near Chicago,, Illinois, at the age of 67. He had been ill for over a year. He was born in Arlington Heights and, except for two years in Chicago, lived there all his life. His collection of Lepidoptera, gathered during 58 years, has been bequeathed to the Chicago Natural History Museum. His wife, PAULINE G. R. McELHOSE, a son, and two daughters survive him.

JOHN L. SPERRY, Riverside, California, on 21 January 1954, at the age of 60. He was born in Oaklawn, Rhode Island, and graduated as a civil engineer from Brown University. After 1925 he and his naturalist wife, the late GRACE HERRESOFF SPERRY, lived in Riverside. SPERRY had recently remarried. He was a Charter and Sustaining Member of The Lepidopterists' Society and was serving on the Executive Council of the Society. One of the leading field lepidopterists in America, he was also an outstanding authority on taxonomy of the Geometridæ of various parts of the world, notably North America. His superb collections of Lepidoptera have been placed in the American Museum of Natural History in New York.

C. L. REMINGTON

GEOFFREY DOUGLAS HALE CARPENTER

On 30 January 1953, Professor G. D. HALE CARPENTER died at the Radcliffe Infirmary, Oxford, England, at the age of 70, after several months of illness. He was one of the five Honorary Members of The Lepidopterists' Society. For many years he had been the leading authority on insect mimicry. He was a follower and close friend of EDWARD BAGNALL POULTON and succeeded him as Hope Professor of Zoology (Entomology) at Oxford University when Sir EDWARD retired in 1933. At that time CARPENTER was

elected Fellow of Jesus College, Oxford. He held the Hope chair until he reached the age limit in 1948, when he was appointed Emeritus Professor.

His early career was in the field of medicine, in which he specialized in insect-borne diseases. During many years of investigation of Tse-tse fly sleeping sickness in Africa he found time to work steadily on his favorite problems of mimicry and systematics of African butterflies. During the last twenty years of his life he concentrated professionally on Lepidoptera. At the time of his death the Zoological Society of London had in proof his great monograph of the geography and systematics of the Danaine butterflies of the genus *Euplœa* of the islands of the southwestern and central Pacific region. The manuscript had been completed in May 1951. His friends, Dr. B. M. HOBBY and N. D. RILEY, saw it to press after his passing.

CARPENTER was born in Eton College on 26 October 1882. His father, P. HERBERT CARPENTER, D.Sc., F.R.S., was then an assistant master at Eton. His grandfather was the distinguished British physiologist, WILLIAM BENJAMIN CARPENTER, D.Sc., F.R.S. CARPENTER was first educated at the Dragon School and Bradfield College. He attended Oxford University as a member of St. Catherine's and received his B.A. in 1904. He had a very early interest in natural history, and it is reported that while an undergraduate he read his first paper on the Mother-of-pearl Moth (*Sylepta ruralis* Scop.) and its parasites, before the Ashmolean Natural History Society of Oxfordshire.

After graduating from Oxford, HALE CARPENTER entered a medical career, studying at St. George's Hospital, London, from which he received the degrees of B.M. and B.Ch. in 1908. He took the D.M. in 1913, presenting results of his study of the Tse-tse fly as his dissertation. With his special interest in entomology, it was natural that he was attracted to the study of insect-borne diseases. In 1910, when studying Tropical Medicine at the London School, he was asked to undertake a study of the biology of the Tse-tse fly *(Glossina palpalis)* which is the carrier of African Sleeping Sickness (Trypanosomiasis) in Uganda. He entered the Colonial Medical Service and left England in June 1910 to take up work on the north shore of Lake Victoria Nyanja, at the source of the Nile. He soon moved to the islands in the northwest corner of the Lake, to study the Tse-tse on depopulated islands, principally at Damba, Bugalla in the Sesse Islands, and Kome. For nearly three years he remained there, investigating not only the Tse-tse but also the other forms of animals and plants.

He had known POULTON at Oxford and had remained in correspondence with him in Africa. This undoubtedly stimulated CARPENTER'S early interest in the adaptive significance of animal coloration, particularly mimicry in butterflies and some other insects. During his residence in the islands he made some of his now classic studies of those most wonderful mimicking complexes: *Pseudacræa eurytus* Linné, which strikingly resembles various species of the inedible danaid genus *Bematistes* (=*Planema*); and *Papilio dardanus* Brown, which mimics danaids of several genera. His experiences

on the islands form the substance of his first book, *A Naturalist on Lake Victoria,* published in 1920.

With the outbreak of the First World War, CARPENTER was called to medical duty, in August 1914, with the British troops on the Uganda—German East Africa frontier. In December of 1914, after four months of preparation, CARPENTER was appointed Medical Officer of a fort at Kakindu, on the southern border of Uganda. Here he spent about a year, with plenty of time for the pursuit of Lepidoptera. In the book on his wartime field studies, *A Naturalist in East Africa* (1925), he wrote (p. 23):

> "The wet weather, when the afternoons were sunny and hot, produced vast numbers of butterflies, and as my military duties were done by about eleven in the morning I made the most of exceptionally favourable circumstances, and as soon as the morning quinine and sick parades (not to mention the 'Jigger' parade) and the daily round of sanitary inspection were over, I went off to the forest and collected there through the middle of the day, getting back in time for a meal about four, and the evening sick parade. This was for me an extraordinarily exciting time, for I had never collected in a large forest before, and every day yielded something of fresh interest. For in the island forests of Lake Victoria, although individuals had been fairly abundant, species were not numerous, while at Kakindu the hosts of butterflies passed beyond anything I had ever seen; some days are quite unforgettable."

For three months early in 1916 CARPENTER was stationed in the southwest corner of Uganda, but from May 1916 to January 1918 he was located at various camps in central Tanganyika Territory, about 200 miles south or southeast of Lake Victoria. In this region Lepidoptera and other insects were collected steadily, but it was here, at Itigi, that the famous experiments were carried out to test the edibility to young insectivorous monkeys of conspicuously *versus* cryptically colored insects. The results were striking, probably the best body of data in print on the correlation between "warning coloration" and distastefulness. He wrote in the 1925 book (p. 148) of an amusing event during the course of these tests:

> "On one occasion I had in my hand a beetle of a group regarded by the monkey as extremely distasteful. I offered my closed fist to the monkey, who came running up to see what was there; when I opened my hand and he saw the nature of the beetle he broke into a broad grin and walked away, evidently treating the matter as a joke!"

During January to November of 1918, CARPENTER was principally at Dar es Salaam, near Zanzibar, and at Mozambique, when the end of his military service finally came, just before the Armistice. He wrote: "To my intense joy I was told that the importunities of the Uganda government had at last had an effect, and I was released by the military authorities to return to my work on the Tse-tse fly on which I had been employed when the

war broke out." For his service during the war CARPENTER was appointed Member of the Order of the British Empire (M.B.E.).

CARPENTER returned to the Colonial Medical Service as a sleeping sickness control officer in Uganda after the war. He retired from the Service in 1930, but on special request he carried out a study of *Glossina* in Ngamiland in 1930-31. During these dozen years he was a prolific writer; in addition to the two books on natural history, he published a steady stream of papers on butterfly geography, mimicry in several insect groups, and his Tse-tse fly research.

In 1919 he married AMY FRANCES THOMAS-PETER, from Cornwall, England. Mrs. CARPENTER survives him. They had no children.

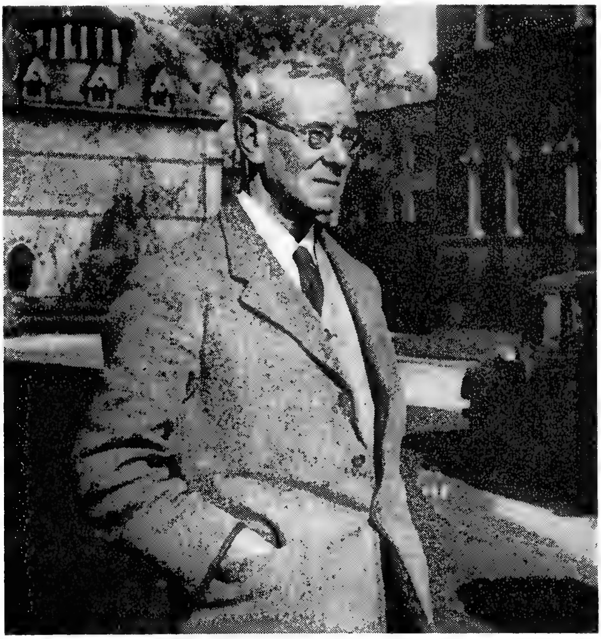
On his retirement from the Medical Service, HALE CARPENTER returned to Oxford and POULTON. There he began almost daily visits, to work with the unique collections in the Hope Department. He built a house close to Oxford, at Cumnor Hill, where he lived for the rest of his life and pursued his hobby of gardening for recreation.

At Oxford, with the congenial comradeship of POULTON, CARPENTER plunged harder than ever into his preferred problems of adaptive coloration. Among others, he paid special attention to the role of birds as predators of butterflies and therefore shapers of mimicry. Some years earlier, POULTON and the mimicry theory had been violently attacked in a series of papers by the American entomologist and ornithologist, W. L. MCATEE. MCATEE and others maintained that birds do not feed on butterflies often enough to be significant factors in mimicry. CARPENTER, and in part POULTON, gradually recorded a convincing body of data proving that in many parts of the world birds and other visual hunters do prey heavily on edible species of butterflies **other than mimics** of such distastful forms as the Danaidæ and the *Aristolochia*-feeding Swallowtails. Soon after his return to England, he published the superb little volume, *Mimicry* (1933), for which E. B. FORD prepared a section on the genetics of mimicry.

Professor POULTON carried on a very voluminous correspondence with naturalists in all parts of the world. This, added to the administrative responsibilities of the Hope chair and of important offices in several leading scientific societies, hindered his progress in writing a long-planned *magnum opus* on adaptive coloration in animals. POULTON retired from the Hope chair in 1933 with the intention, never brought to fruition, of concentrating on the book. It was logical that HALE CARPENTER should have been elected his successor in the Hope Professorship.

When his knowledge of concealment, Africa, and tropical medicine was needed during the Second World War, CARPENTER helped to prepare soldiers in training near Oxford, and he also wrote guide books for use by the military forces in Africa.

CARPENTER was an effective organization officer and served several societies as a leader. He was President of the Royal Entomological Society in 1945-46. He took an important part in the affairs of the Pacific Science Congresses and became known personally in North America while attending these meetings. In England he was also active in meetings of the Royal Society, the Linnean Society, and the Zoological Society of London, and he was an elected Fellow of the latter two.



I am indebted to Mrs. AUDREY SMITH and to the present Hope Professor, Dr. GEORGE C. VARLEY, for the two photographs. The first was taken a number of years ago; the snapshot was taken 31 July 1948, the day CARPENTER retired from the Professorship. Mrs. SMITH also very kindly prepared a major portion of the following bibliography. I have drawn freely on the biographical information given in Dr. B. M. HOBBY'S fine obituary of Professor CARPENTER (*Brit. Med. Journ.* 1: 406; 1953).

CHARLES L. REMINGTON, Osborn Zoological Lab.,
Yale University, New Haven 11, Conn., U. S. A.

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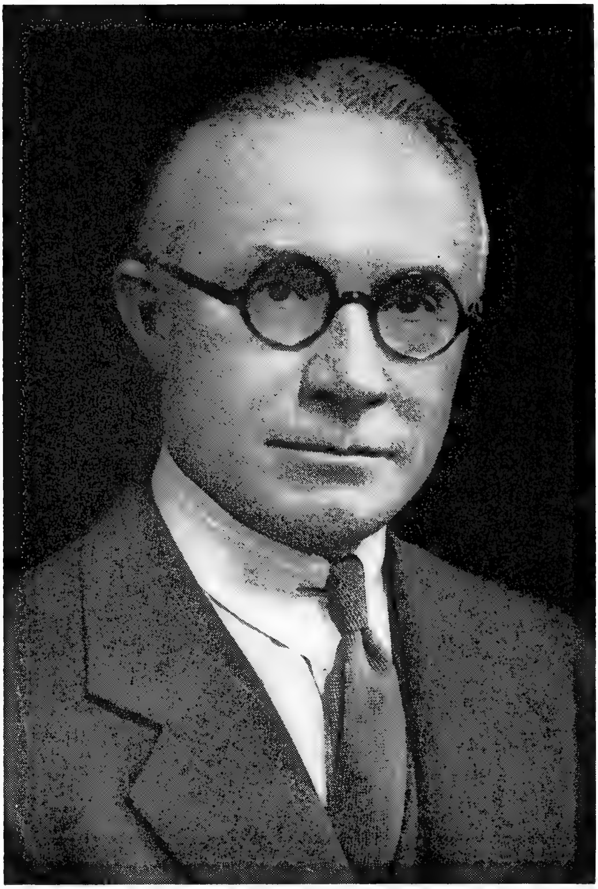


WILLIAM PRESCOTT ROGERS

WILLIAM PRESCOTT ROGERS, a charter member of The Lepidopterists' Society and a life-long enthusiast in the study of the Lepidoptera, died May 6, 1953, after an illness of many months.

PRESCOTT ROGERS was born October 12, 1887, at Brookline, Massachusetts, the son of the late EDWIN ALBERT and HARRIET (PRESCOTT) ROGERS. He was educated in the public schools of Brookline and Newton, and at Harvard College, where he graduated with the class of 1911. He then went into the cotton brokerage business with the firm of E. A. Shaw & Co. of Boston, and in 1914, as manager of their Fall River branch, he settled in that city where he lived for the rest of his life. He was very successful in business, and that his judgement and influence were highly regarded by others was attested by his presence on the boards of directors of several institutions both business and charitable. The portrait was taken in about 1945.

He first became interested in butterflies as a boy around Brookline and Newton, forming a small collection before he was in High School. This interest always remained, and after settling in Fall River he entered with enthusiasm into collecting as his favorite avocation.

ROGERS specialized in the butterflies of New England and built up an excellent collection of the species of this region, mostly by his own efforts, also by exchange. Most of his collecting was done in and about Fall River and in its environs, especially Westport where he had a summer home. He made many collecting trips, however, to other parts of New England, from the cranberry bogs of Cape Cod to the slopes of Mt. Katahdin in Maine, and he always had his net along on occasional trips to the South and Southwest. His collection, which is in Denton glass mounts, is deposited in the Fall River Public Library, where it may be seen by request.

He also brought together a notable collection of books on butterflies, his interest therein being that of a bibliophile as well as of an entomologist, so that his library included many of the rarer classical publications as well as those of immediate practical use.

PRESCOTT ROGERS had a wide acquaintance among lepidopterists, both personal and by correspondence.

Besides the Lepidoptera, his avocations were golf, in which he was an outstanding player, and ornithology, which had given him a thorough knowledge of the birds of his region.

ROGERS is survived by his widow, GRETCHEN (HARWOOD) ROGERS, three sons, two daughters, and ten grandchildren.

Optimistic in outlook, sincere, genial, and unbounded in enthusiasm for whatever work was in hand, his company in any project was an inspiration and encouragement, and to his friends a privilege of great value.

ELMER T. LEARNED, 542 Maple Street, Fall River, Mass., U. S. A.

Dr. EUGENE G. MUNROE has found it necessary to resign as Associate Editor for the annual Season Summary. He has, however, agreed to remain on the Editorial Board of the *News* as an advisor and literature reviewer.

SMITH AND HULST COLLECTIONS OBTAINED BY AMERICAN MUSEUM OF NATURAL HISTORY

The Department of Insects and Spiders of the American Museum of Natural History proudly announces the accession of the JOHN B. SMITH and GEORGE D. HULST collections of Lepidoptera. This valuable accession was made possible through the cooperation of Dr. WILLIAM H. MARTIN, Dean of the College of Agriculture, and Professors BAILEY B. PEPPER and JOHN B. SCHMITT, Department of Entomology, Rutgers University. This is one of the most valuable collections of North American Lepidoptera in existence, as it consists of 32,022 specimens representing almost 6,000 species. It contains over 2200 type specimens including approximately 1200 holotypes. The majority of these type specimens are those of SMITH and HULST, who were the outstanding authorities on the North American Phalænidae (Noctuidæ), Geometridæ, and Pyralidæ of their generation. There is a small amount of type material of other authors.

JOHN B. SMITH (1858-1912) came to Rutgers in 1889, after spending the preceding three years at the United States National Museum, and remained there until his death. He was the State Entomologist of New Jersey from 1894 until 1912. SMITH built up the North American Phalænid collection at Rutgers until it was one of the best collections in this family in existence. As he was the leading authority on this family, he also received material for identification from different collectors, and thus more interesting specimens came to hand. SMITH described a very large number of new species, and he published a great number of papers. These include not only papers with the original descriptions of new species, but a number of generic revisions and check lists. The collection at Rutgers formed the basis for the majority of these, and hence its great value.

GEORGE D. HULST (1846-1900), while describing a number of Phalænids, is better known for his work on the Geometridæ and Pyralidæ. The HULST collection is one of both butterflies and moths, but is richest in his specialties. He published almost one hundred papers, mostly on descriptions of early stages and of new species of Lepidoptera. Included in this list of publications were revisions of the North American Epipaschiinæ, Phycitidæ, and Geometridæ, which still stand as the basic works in these groups. These papers were based mainly on his collection, which was given to Rutgers and contains many types.

Every specimen in these collections is labeled with the original J. B. SMITH or G. D. HULST collection labels, or is being so labeled before being incorporated into the Lepidoptera collection of the American Museum of Natural History. In this way, future workers can recognize the specimens from these collections. The primary types are being segregated into the type collection at the American Museum, and a list of all type material is being prepared. An identified collection of Lepidoptera is being deposited in the Department of Entomology of Rutgers University.

FREDERICK H. RINDGE,
Associate Curator, Dept. of Insects and Spiders,
American Museum of Natural History, New York 24, N. Y., U. S. A.

FRANK MORTON JONES COLLECTION PRESENTED TO YALE UNIVERSITY

It is a great pleasure to announce the generous gift by Dr. FRANK MORTON JONES of the major portion of his Lepidoptera collection to Yale University. The cabinets were transferred from Dr. JONES'S home in Wilmington, Delaware, to the Peabody Museum of Natural History during the fall of 1953. They contain approximately 2700 Rhopalocera and 6500 Heterocera, the latter including over 800 determined "micros" representing a substantial part of the northeastern species, which Dr. JONES had prepared expressly to help to overcome the lack of a reference collection of "micros" at Yale. The JONES collection is of a modest size; however, there are many specimens in it of special value for the kind of studies the Yale group is pursuing. *Limenitis* is represented by a remarkable series. The *Erynnis* set is large and includes reared specimens. There are *Mitoura hesseli* from North Carolina and a number of *Eumæus atala* from Florida. There are specimens from some of Dr. JONES'S famous experiments to test edibility of various Lepidoptera. No primary types are represented, but there are several cotypes of *Callosamia carolina* Jones and some Hesperiidæ paratypes. Geographically, the specimens were collected largely in New England, North Carolina, Florida, California, and of course the Wilmington area.

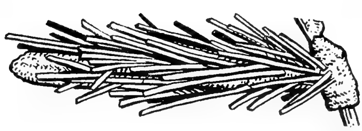
Dr. JONES included in his gift to Yale his entire collection of insects reared from insectivorous plants (notably from *Sarracenia* spp. and *Darlingtonia*). Among the insects are large and beautifully prepared series of *Exyra* spp. and *Papaipema appasionata,* and with these are many vials of larvæ and pupæ preserved in alcohol. Dr. JONES is the foremost authority on biology of Pitcher-plant insects as well as the taxonomy of the North American Psychidæ.

It is Dr. JONES'S intention that his unique collection and library on Psychidæ shall join the BARNES material at the U.S. National Museum, along with certain Hesperiidæ and most of the Microlepidoptera taken in his faunal study of Marthas Vineyard Island (Massachusetts).

A further generous gift from Dr. JONES to the Peabody Museum at Yale is a large share of his entomological library. It contains complete sets of several American entomological periodicals and hundreds of important books and monographic publications. These are forming the nucleus of the working reference library to be shelved permanently with the insect collections and to be known from this time as "The Jones Entomological Library". Most of this, of course, was represented in the large entomological holdings in the central Sterling Library of Yale University.

The JONES Lepidoptera will be integrated gradually into the Museum's collection, with the lone exception of the material from insectivorous plants. All of the latter will be held as a segregated collection, which we expect to enlarge from time to time.

CHARLES L. REMINGTON, Research Associate in Entomology,
Peabody Museum of Natural History,
Yale University, New Haven 11, Conn., U. S. A.



PROPOSED AMENDMENTS TO THE CONSTITUTION OF THE LEPIDOPTERISTS' SOCIETY

The following amendments to the Constitution of the Lepidopterists' Society have been proposed by five members, as provided in Art. XII, Sec. 1, and transmitted by the Secretary for publication in the *News.* These amendments will be submitted to the members for action, with the annual ballot, toward the end of 1954. These are concerned principally with completing the arrangements for transacting Society business by mail, rather than at the Annual Meeting. It is also proposed that the minimum term for election of Secretary and Treasurer be increased from two to three years. Soon after final action on these proposals it is expected that the revised Constitution and By-laws will be published in full in the *News.*

Art. III, Sec. 4: delete last sentence. Insert in first sentence between "for" and "membership in": "Active, Sustaining, and Life". Add new final sentence: "The annual dues shall be fixed by the By-Laws."

Art. III, Sec. 5: delete entirely. Change the numbering of Sections 6, 7, 8, and 9 to 5, 6, 7, and 8, respectively.

Art. III, new Sec. 6, delete: ", not exceeding ten in number,". Add new final sentence: "There shall not be more than ten living Honorary Members."

Art. IV, Sec. 2, delete: "of thirteen members."

Art. IV, Sec. 5: delete entirely.

Art. V, Sec. 1, delete: "before the annual meeting" and substitute "ballots are mailed by the Secretary".

Art. V, Sec. 2, delete: "at the annual meeting". Change "for the term of two years" to "for the term of three years". Delete ", except that at the first election . . . . two for three years". Delete "Members not attending . . . . by mail ballot."

Art. V, Sec. 3, delete: "at an annual meeting" and substitute: "in *The Lepidopterists' News*". Delete: "at any subsequent annual meeting" and substitute: "in any one calendar year".

Art. VI, add new Sec. 9: "The Society shall not and may not make any dividend, gift, division, or bonus in money to any of its members.

Art. VI, Sec. 4, delete: "for the annual meetings".

Art. IX, Sec. 3, delete: "a report at each annual meeting" and substitute: "an annual report".

Art. X, Sec. 1, delete: "Thirty days before an annual meeting". Delete "the meeting" and substitute "the Secretary before December 31st."

Art. XI, Sec. 3: delete entirely.

Art. XII, Sec. 1: delete "at any annual meeting" and "present, or represented by proxy, or". Delete "holding of the annual meeting" and substitute "annual ballot is mailed in November".

C. L. REMINGTON

ELECTION OF SOCIETY OFFICERS FOR 1954

A total of 236 members cast mail ballots for 1954 officers, with each candidate of the Nominating Committee receiving about 99% of the ballots cast. The new officers are listed in the back cover of this issue.

REVIEWS

BRITISH PYRALID AND PLUME MOTHS. By Bryan P. Beirne. 208 pp. 16 col. pls., 189 figs. London, 15 Sept. 1952. Publisher: Frederick Warne & Co., Ltd., London, and 79 Madison Ave., New York, N. Y. Price $5.00.

The British Pyralidoidea include 174 species of Pyralididae, 35 Pterophoridae, and 1 Orneodidae (no longer considered a pyralidoid by contemporary workers). Dr. Beirne has given keys to the families, subfamilies, genera, and species. For many species there are further comments on color in the text. The habits and habitats, British distribution, and seasonal characteristics are described in some detail. It is remarkable that something is known of the life-history of all 36 of the plume-moths and of 143 of the 161 regularly occurring British pyralids. Where possible, descriptions of all stages are included, with foodplant notes.

The identifying characters used in the keys are clearly illustrated with line drawings and defined in the glossary. Genitalia are not usually figured, because these have been recently illustrated for both sexes (Pierce & Metcalf, *The genitalia of the pyrales, deltoids,* and *plumes*; 1938); similarly the larvae are not figured, since colored figures of most larvae were given by Buckler (*Larvae of British butterflies and moths;* 1899). The colored plates of the Beirne book show nearly every established British species, but most of them leave much to be desired in the reproduction.

This new addition to Warne's fine "Wayside and Woodland Series" should be an essential reference volume for any European lepidopterist interested in the pyralidoids and of special value for the non-European fauna for comparisons.

C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

BUTTERFLY FARMER. By L. Hugh Newman. 208 pp., 67 plates and frontspiece. Publisher: Phoenix House Ltd., London, England. 1953.

A butterfly farmer must be a rather rare individual, but a second generation butterfly farmer must be almost unique. More than fifty years ago, L. W. NEWMAN, then a tobacco brokers apprentice, gave his employer a case of butterflies he had bred. These attracted the attention of a wealthy collector who was so impressed that he urged NEWMAN to make a career of raising butterflies. Relying on the collector's guarantee to purchase £100 worth of butterflies a year for five years, NEWMAN forsook his apprenticeship and embarked upon raising butterflies as a full time occupation. The business prospered and now his son writes a history of the Butterfly Farm at Bexley, Kent. There are also chapters on other butterfly topics such as migration, introduction of new species, origins of popular names, butterfly auctions, and several chapters relating anecdotes of collectors and collecting.

Although the book is written for the general reader, it is filled with all sorts of practical hints for anyone interested in collecting or raising butterflies. Even the seasoned lepidopterist must lend an ear to the secrets of a commercial breeder. For example, there are observations on the care of hibernating caterpillars and notes on how to raise ant-eating lycænids. Such fascinating suggestions are casually dropped as the forced feeding of valuable hawk moths kept for brood stock. There are reflections on such diverse topics as breeding aberrations, flower preferences, forcing early emergence from pupation, and the length of time pairs remain coupled.

Between World Wars the popularity of butterfly collecting in England was such that the facilities of a small resort town, Royston in Hertfordshire, were filled with collectors awaiting the emergence of the Chalk-hill Blue. There are accounts of as many as a score of collectors on a single acre, some of them in frock coat and striped trousers. Americans may well speculate on the reason for the greater popularity of collecting in England. Did any American collector ever have difficulty with reservations because of the seasonal influx of other collectors into some favored spot?

Mr. NEWMAN, who has had much experience in the auction room (he first acted as a commissioned bidder while a school boy) relates that auction sales of butterflies have been regularly held for more than a hundred years. During World

War II the butterfly auction rooms received a direct hit, but there was such a demand for sales that other premises had to be found. Some individual butterflies, usually striking aberrations, have extended histories at auction. For example, an entirely white Marbled White was caught in 1843 sold the next year for £20, in 1925 for £35, in 1943 for £49, and in 1946 was paired with a melanic specimen and both insects sold as a single item for £110.

Sir WINSTON CHURCHILL is revealed as interested in butterflies to the extent of building a summer house in which to watch the emergence of chrysalides supplied by Mr. NEWMAN and in commissioning the stocking of his estate at Chartwell with butterflies. Besides schools and other educational institutions the Butterfly Farm supplies living specimens for the insect houses of the London and Bristol Zoos. Once the farm filled an order from the New Zealand government for 60,000 pupæ of a moth to be used in weed control.

Perhaps the most fascinating story of the book is the account of the efforts to establish a Dutch race of the Large Copper in lieu of the native British race which had been exterminated by over-collecting and reclamation. A reserve was endowed by the Hon. CHARLES ROTHSCHILD; the area was planted with the food plant; wardens were posted; and the stock secured. After twenty years the colony survives.

JAMES R. MERRITT, School of Law, University of Louisville, Louisville 8, Ky., U. S. A.

MICROLEPIDOPTERA OF NEW GUINEA. Results of the Third Archbold Expedition (American-Netherlands Indian Expedition 1938-1939). Part II. By A. Diakonoff. *Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Natuurkunde,* 2nd ser., vol. 49, No. 3: pp. (1) — 166, figs. 209-372. Amsterdam, 1953.

The present paper is the second part of the distinguished work on the Microlepidoptera of New Guinea of which Part I was recently reviewed in *The Lepidopterists' News* (vol. 7: p. 128; 1953).

This paper brings descriptions and records of Tortricidæ, subfamilies Tortricinæ (conclusion) and Eucosminæ. Thirteen genera and 106 species are described as new. This high number of new species is the more remarkable in view of the fact that the records of the Archbold Expedition reported in the second part of the work include in all only seven of the already known species.

As in Part I, keys to Papuan species are given us. The preliminary key to the Tortricinæ genera is replaced by a definitive one. The illustrations (164 figures) are very accurate. The paper concludes with addenda and corrigenda to its preceding part; seventeen New Guinean species and two genera described by the author in the *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen,* ser. C, vol. 55, 1952, are listed.

The most amazing of the new genera are undoubtedly *Arctephora* (Generotype: *A. iubata* spec. nova) and *Nikolaia* (Generotype: *N. melanopsygma* spec. nova) both monobasic and ranked by the author in the subfamily Tortricinæ. These genera having a haired cubitus of the hind wing, a feature very unusual among the Tortricinæ, can provide a basis for radical changes in modern views on the classification of the family Tortricidæ in general. It would therefore be advisable for the author to publish enlarged photographs or drawings of species, generotypes of both the new genera, and a detailed morphological comparison of their haired cubitus with the cubital pecten of Sparganothinæ and Olethreutinæ (=Eucosminæ in the paper under review).

As for the new taxonomic views of the author, a consideration of the genus *Cryptophlebia* Wlsm. being a synonym for *Pseudogalleria* Rag. is especially interesting. The referring of the new species *myodes* to the Nearctic genus *Sereda* Heinr. is in the mind of the reviewer very problematic because the genitalia of the new species were not studied by the author. (The abdomen of the unique male type was missing.)

In a letter to the reviewer, the author wrote about that publication of Part III of his work is expected this year, and that Part IV had been submitted to the editor for printing. It is hoped that the author may soon complete the whole work, whose successive parts will be reviewed as they appear.

NICHOLAS S. OBRAZTOV, 11 Cromwell Place, Sea Cliff, Long Island, N.Y., U.S.A.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world's literature will be virtually complete. It is intended that every paper and book published after 1946 will be included. **Abstracts give all new subspecies and higher categories, with type localities and generotypes.** Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members. Initials of cooperating abstractors are as follows: [P.B.] - P. F. BELLINGER; [A.D.] - A. DIAKONOFF; [C.R.] - C.L. REMINGTON.

B. SYSTEMATICS AND NOMENCLATURE

Boursin, Ch., "Ueber zwei *Autophila*-Arten aus den Brandt'schen Ausbeuten in Süd- und Ost-Iran" [in German]. *Zeitschr. Weiner Ent. Ges.*, vol.32: pp.142-148, 3 pls. 30 July 1948. Describes as new *A. libanotica perornata* (Tahte-Malek, Baluchistan). Redescribes *A. subfusca.* Discusses related forms, figuring adults and ♂ genitalia of some. [P. B.]

Boursin, Ch., "Neue palaearktische *Agrotis*-Arten aus dem Naturhistorischen Museum in Wien nebst Synonymie-Notizen" [in German]. *Zeitschr. Wiener Ent. Ges.*, vol. 33: pp.97-136, 14 pls. 1 Dec. 1948. Describes as new: *Euxoa zugmayeri* (West Tibet); *Agrotis xylographa* (Poddaban, Transbaikal, Siberia); *Ochropleura (Dichagyris) eremopsis* (Korla, Chinese Turkestan); *(Ogygia) perturbans* (Akso, Chinese Turkestan); *O. (O.) subturbans* (Ft. Naryn, Semiretschje, Turkestan); *O. geochroides* (Richtofen Range, Liang-Tschou, West China); *Hemiexarnis nivea* (Ft. Naryn, Turkestan); *Eugraphe exusta sinica* (Ta-Tsien-Lu, Szechuan); *E. disgnosta* (Mt. Daisen, Hohki, Japan); *E. longipennis* (Japan); *E. megaptera* (Siao-Lou, Szechuan); *Diarsia moltrechti* (Mt. Morrison, Formosa); *D. beckeri* (Kinfushan, Szechuan); *D. formosana* (Mt. Morrison, Formosa); *Pachnobia xena* (Noworotnaja, Transbaikal); *Amathes pseudaccipiter* (Ta-Tsien-Lu, Szechuan); *A. sturnecki* (Szechuan); *A. draesekei* (Sunpanting, Szechuan); *A. triphænoides* (Ta-Tsien-Lu, Szechuan); *A. amydra* (Ta-Tsien-Lu, Szechuan); *Cerastis orientalis* (Nikolsk-Ussurijsk, E. Siberia); also one "form". Figures adults, and genitalia of these and some related spp. Synonymizes some 45 spp. and sspp. [P. B.]

Clements, A. N., "A revision of *Diparopsis* Hmps. (Agrotidæ, Lepidoptera)." *Bull. Ent. Res.*, vol.42: pp.491-497, 12 figs. Nov. 1951. Describes as new *D. perditor* (Meisso, Ethiopia); *D. gossypioides* (north of Lindi, Tanganyika). Figures frontal processes and ♂ genitalia of the four known spp. [P.B.]

Dammerman, K. W., "Proposals concerning the nomenclature of family names and of names of economically important insects to be submitted to the IXth International Congress of Entomology at Amsterdam." *Trans. 9th Int. Congr. Ent.*, vol.1: pp.203-204. March 1953. Proposes appointing of a special international committee for fixation of family names and of names of economically important insects, viz. a certain number of each per year. [A.D.]

Ferrière, Ch., "Le fardeau des vieilles espèces inconnues" [in French]. *Trans. 9th Int. Congr. Ent.*, vol.1: pp.194-196. March 1953. Makes proposals for reglementation of old, unknown, not identified names: their liquidation, or redescription of the species concerned. [A. D.]

Forbes, William T.M., "A draft key to *Taygetis* (Satyrinæ)." *Lep. News*, vol.6: pp.97-98. 19 Feb. 1953.

Gerasimov, A. M., "Description of the pyralid *Chilo tadzhikiellus* Gerasimov and of the noctuid *Sesamia cretica striata* Stgr.; injurious to sugar-cane in Tadzhikistan" [in Russian]. *Trud. Zool. Inst. Akad. Nauk SSSR*, vol.8: pp.700-713, 9 figs. 1949. *C. tadzhikiellus* described as new. [Not seen.]

Hackman, Walter, "On the *Choreuthis myllerana* group (Lepid., Choreuthidæ)." *Notulæ Ent.*, vol.26: pp.71-75, 12 figs. 15 Feb. 1947. Describes as new *C. montelli* (Geta, Finland); *C. sibirica* (V. Sujetuk, Siberia). Redescribes 3 other spp. Figures fore wing and genitalia of all. [P.B.]

Hackman, Walter, "Zwei neue Kleinschmetterling aus Finland" [in German]. *Notulæ Ent.*, vol.30: pp.23-25, 6 figs. 1950. Describes as new *Stomopteryx karvoneni* (Kouvola); *Tortrix fuliginosana* (Vouksenniska); figures adults and genitalia. [P.B.]

Hemming, Francis,"Zoological nomenclature." *Nature,* vol.170: p. 938. 29 Nov. 1952. *Science,* vol.116: p.546. 14 Nov. 1952. Notice of impending action by the International Commission on questions involving *Sphinx, Phalæna, Bombyx, Noctua, Geometra, Tortrix, Pyralis, Tinea, Alucita, Attacus, Episema, Diloba,* and *cydippe* L., *adippe* L., and *adippe* D. & S. [P.B.]

Jackson, T. H. E., "Notes on some new or rare Rhopalocera from eastern Africa. Parts I and II." *Proc. Roy. Ent. Soc. London (B),* vol.20: pp. 91-96, 97-105, 1 pl. 15 Aug., 15 Oct. 1951. Describes as new: *Pseudacræa dolomena elgonensis* (W. Elgon, Uganda); *P. d. congoensis* (Mt. Walikali, Congo); *Neptis metella flavimacula* (W. Elgon, Uganda); *N. incongrua kikuyuensis* (Aberdare Mts., Kenya); *Monotrichitis sophrosyne brunnea* (Kalinzu Forest, Uganda); *Acræa excelsior usambaræ* (Usambara Mts., Tanganyika); also several "forms". Notes on some other butterflies of the West Elgon area and of East Africa generally. Figures in color 8 *Pseudacræa.* [P.B.]

Kiriakoff, S. G., "Les organes tympaniques des Lépidoptères comme charactère systématique et phylogénétique" [in French]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.71-75. March 1953. Gives a survey on the importance of the tympanal organs for the classification of higher groups of Lepidoptera [P.B.]

Klots, Alexander B., & Harry K. Clench, "A new species of *Strymon* Huebner from Georgia (Lepidoptera, Lycænidæ)." *Amer. Mus. Novit.,* no.1600: 19 pp., 3 figs. 11 Dec. 1952. Describes as new *S. kingi* (Savannah). See review in *Lep. News,* vol.7, p.26.

Lempke, B. J., "De generieke nomenclatuur van onze kleine Wapendragers" [in Dutch: Generic nomenclature of 5 Europ. species formerly included in *Pygæra;* with English summary]. *Ent. Berichten,* Vol.13: pp.262-265, 3 figs. 1 May 1951.

Lempke, B. J., "De nomenclatuur van onze Hermelijnvlinders" [in Dutch: the nomenclature of our Puss Moths; with English summary]. *Ent. Berichten,* vol.13: pp.293-296, 6 figs. 1 July 1951.

Michener, Charles D., "The Saturniidæ (Lepidoptera) of the Western Hemisphere. Morphology, phylogeny, and classification." *Bull. Amer. Mus. Nat. Hist.,* vol.98: pp.335-502, 1 pl., 420 figs. 3 March 1952. Describes as new: *Psilopygida basalis* (Paraná, Brazil); *Hylesia gamelioides* (Chiapas, Mexico). See also review in *Lep. News,* vol.6: pp.109-111.

Munroe, E. G., "The *Karanasa* butterflies—a critical review." *Lep. News,* vol.7: pp.16-23. 20 Apr. 1953.

Nabokov, V., "The female of *Lycæides argyrognomon sublivens.*" *Lep. News,* vol.6: pp.35-36. 8 Aug. 1952.

Nabokov, V., "On some inaccuracies in Klots' *Field Guide.*" *Lep. News,* vol.6: p.41. 8 Aug. 1952.

F. BIOLOGY AND IMMATURE STAGES

Davatchi, A., & M. Vakilian, "Les pyralides nuisibles aux produits emmagasinés" (in Arabic, French summary). *Ent. & Phytopath. Appliqués* (Tehran), no.12-13 pp. 56-66, 7 figs. Biology and control of *Ephestia kühniella* and *Plodia interpunctella;* figures larvæ and adults. [C. R.]

Henson, W. R., "Mass flights of the Spruce Budworm." *Canad. Ent.,* vol. 83: p. 240. Sept. 1951.

Tenhet, Joseph N., & C. O. Bare, "Control of insects in stored and manufactured tobacco." *U. S. Dept. Agric. Circ.* no. 869: 32 pp., 20 figs. June 1951. Gives life history and habits of *Ephestia elutella,* with figures. Lists several parasites. *Tlascala finitella* and *Aglossa* sp. also recorded from stored tobacco. [P.B.]

Toumanoff, Constantin, "Action de *Bacillus larvæ* W. agent pathogène de la Loque maligne des larves d'Abeilles sur les chenilles de *Galleria mellonella* L." [in French]. *C. R. Acad. Sci.,* vol. *230*: pp. 1709-1711. 8 May 1950.

Vago, Constantin, "Diversité des symtômes extérieurs dans une même maladie à ultravirus d'insectes" [in French]. *C. R. Acad. Sci.,* vol. 232: pp. 1587-1588. 18 Dec. 1950. Records variable symptoms of polyhedrosis in silkworms. [P.B.]

Walters, S. M., "Biological flora of the British Isles. *Eleocharis* R. Br." *Journ. Ecol.,* vol.37: pp.192-206, 3 figs. July 1949. Larvæ of *Bactra furfurana* recorded as stem feeders. [P. B.]

Webb, D. A., "Biological flora of the British Isles. *Saxifraga* L. (section *Dactyloides* Tausch)." *Journ. Ecol.,* vol.38: pp.185-213, 7 figs. July 1950. Larval food plant of *Entephria flavicinctata, Stenoptilia saxifragæ.* [P. B.]

Wittstadt, H., "Beobachtungen an *Lemonia dumi* L." [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.33: pp.33-38. 1 Oct. 1948. Biology and phenology.

Woodroffe, G. E., "A life-history study of *Endrosis lactella* (Schiff.) (Lep. Œcophoridæ)." *Bull. Ent. Res.,* vol. 41: pp. 749-760, 3 pls. 2 figs. Apr: 1951: Biology and morphology of all stages. Records 2 predators and 5 parasites. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Bottger, G.T., "Sugar and protein in the corn plant as related to nutrition of the European corn borer." *Journ. Econ. Ent.,* vol. 44: pp. 40-44. Feb. 1951. *Pyrausta nubilalis.*

Bradfield, J.R.G., "Phosphatases and nucleic acids in silk glands: cytochemical aspects of fibrillar protein secretion." *Quart. Journ. Micr. Sci.,* vol. 92: pp. 87-112, 2 pls., 2 figs. Mar. 1951. Work done on *Bombyx, Cossus* and spiders. [P.B.]

Drilhon, Andrée, "Identification chromatographique et chimique d'une substance fluorescente du sang et du tube de Malpighi de la larve de *Bombyx mori* atteinte de grasserie" [in French]. *C.R. Acad. Sci.,* vol. 232: pp. 1876-1878. 16 May 1951. A normal constituent of silk is released in the blood in this disease. [P.B.]

Niemierko, Stella, & W. Niemierko, "Metaphosphate in the excreta of the Wax Moth, *Galleria mellonella." Nature,* vol. 166: pp. 268-269. 12 Aug. 1950.

Osborne, M.F.M., "Aerodynamics of flapping flight with application to insects." *Journ. Exp. Biol.,* vol. 28: pp. 221-245, 15 figs. June 1951. Mathematical analysis; the theoretical conclusions are related to performance figures for 25 spp. of insects, including 5 Macrolepidoptera. [P.B.]

Pavan, M., "Richerche sperimentali sul comportamento degli Artropodi - II: Sulla igroreazione degil insetti" [in Italian]. *Boll. Zool. Agr. Bachic.,* vol. 17: pp. 3-22, 1 pl. 1951. Experiments on reactions to humidity by *Inachis io, Bombyx mori,* and other insects. [P.B.]

Peklo, Jaroslav, & Jiří Satava, "Fixation of free nitrogen by insects." *Experientia,* vol. 6: pp. 190-191, 3 figs. 15 May 1950. Fixation by symbionts in *Ephestia,* clothes moth and other insects demonstrated. [P.B.]

Piepho, Hans, & Helga Meyer, "Reaktionen der Schmetterlinghaut auf Häutungshormone" [in German]. *Biol. Zbl.,* vol. 70: pp. 252-260, 2 figs. 1951. Pieces of larval skin of *Galleria* implanted in host larva undergo pupal and imaginal molts in synchrony with host, and may repeat these molts if implanted in a new host. [P.B.]

Pratt, John J., "A qualitative analysis of the free amino acids in insects blood." *Ann. Ent. Soc. Amer.,* vol. 43: pp. 537-580. Dec. 1950. Analysis made on *Prodenia, Galleria* and other insects. [P.B.]

Rawle, Sylvia G., "The effects of high temperature on the common Clothes Moth, *Tineola bisselliella* (Humm.)." *Bull. Ent. Res.,* vol. 42: pp. 29-40, 2 pls., 4 figs. July 1951.

Rockstein, Morris, "Glycogen metabolism in insects: a review." *Bull. Brooklyn Ent. Soc.,* vol. 45: pp. 74-81. June 1950. Summary of recent work on occurrence of glycogen and its chemical and physiological role in insects, including a number of Lepidoptera. [P.B.]

Roeder, Kenneth D., "Movements of the thorax and potential changes in the thoracic muscles of insects during flight." *Biol. Bull.,* vol. 100: pp. 96-106, 4 figs. Apr. 1951. Contraction of flight muscles in *Agrotis* is directly produced by nerve impulses; in some other insects tested contraction is a resonance phenomenon, with irregular impulses not synchronous with contraction. [P.B.]

Williams, Carroll M., & Howard A. Schneiderman, "The necessity of motor innervation for the development of insect muscles." *Anat. Rec.,* vol.113: pp. 561-562. Aug. 1952. Abstract only.

H. MIGRATION

Beebe, William, & Henry Fleming, "Migration of day-flying moths through Portachuelo Pass, Rancho Grande, North-central Venezuela." *Zoologica, N. Y.,* vol.36: pp.243-254, 1 pl. 28 Dec. 1951. Records 3 Arctiidæ, 17 Dioptidæ, 1 Epiplemidæ, 1 Ethmiidæ, 35 Euchromidæ, 21 Geometridæ, 1 Glyphipterygidæ, 8 Lithosiidæ, 2 Lymantriidæ, 7 Noctuidæ, 1 Notodontidæ, 7 Pericopidæ, 13 Pyralidæ, 2 Gelechiidæ, 1 Psychidæ, 1 Tineidæ, 2 Tortricidæ, 1 Zygænidæ. Figures adults of 45 spp. Some spp. undescribed. [P. B.]

Iwase, Taro, "Some records of butterfly migration in Japan and Korea." *Lep. News,* vol. 4: p. 43. "1950" [Jan 1951].

Kennedy, J. S., "Unidirectional movement in migrating insects." *Trans. 9th Int. Congr. Ent.,* vol.1: pp.348-349. March 1953.

Larsen, Ellinor Bro, "Activity and migration of *Plusia gamma* L. Studies on the activity of insects III." *K. Danske Vidensk. Selsk. Biol. Medd.,* vol.21, no.4: 32 pp., 17 figs. 1949. Field observations and experiments on temperature preference and activity cycles in relation to temperature and light. Migration takes place by sustained upper level flying, with the wind, at night; feeding periods diurnal. [P. B.]

Seilkopf, H., "Über die meteorologischen Verhältnisse bei Falterwanderungen" [in German]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.416-423, 6 maps. March 1953. Studied atmospheric conditions during mass occurrence of *Pyrameis cardui* L. and other butterflies in the Alps. They seem to migrate with tropospheric areas of warm air. [A. D.]

Shull, Ernest M., "Migration of *Catopsilia* butterflies in India." *Lep. News,* vol.6: pp.68-69. 1952.

Williams, C. B., "Migration in Lepidoptera and the problem of orientation." *Proc. Roy. Ent. Soc. London (C)*, vol. 1948-1949: pp.70-84, 1 fig. Review article; considers especially factors which might serve as stimuli in maintaining direction of flight. [P. B.]

Williams, C. B., "The migration and drift of insects and its international aspect." *Trans. 9th Int. Congr. Ent.,* vol.1: pp.63-68. March 1953.

I. TECHNIQUE

Betz, J., "Comment resoudre le probleme du transport d'un important matériel vivant recolte au cours de longs déplacements" [in French]. *Rev. Franç. Lépid.,* vol.13: pp.53-55, 9 figs. "Mar.-Apr." 31 July 1951. Describes a simple sleeve cage for transporting or confining living specimens. [P. B.]

Carne, P. B., "Preservation techniques for scarabæid and other insect larvæ." *Proc. Linn. Soc. N. S. Wales,* vol.76: pp.26-30. 31 May 1951. Various methods are compared; a cheap and very satisfactory fixative is 8% kerosene, 5% glacial acetic acid, and rest alcohol (95%)—modification of Peterson's KAAD fixative. [P. B.]

Coutin, R., "Alimentation des larves de *Laspeyresia pomonella* L. (Lépidoptères, Tortricidæ) sur milieux artificiels" [in French]. *C. R. Soc. Biol.,* vol.146: pp.516-520, 1 fig. 10 Aug. 1952. Reports partial success in rearing species on artificial media with powdered pear base [P. B.]

David, W. A. L., & B. O. C. Gardner, "Laboratory breeding of *Pieris brassicæ* L. and *Apanteles glomeratus* L." *Proc. Roy. Ent. Soc. London (A)*, vol.27: pp.54-56, 1 fig. 16 June 1952. Describes method for insuring year-round supply of host and parasite [P. B.]

Kettlewell, H. B. D., "Use of radioactive tracer in the study of insect populations (Lepidoptera)." *Nature,* vol.170: pp. 584-585. 4 Oct. 1952. Larvæ, pupæ, and especially resulting adults give high counts after feeding on food plants impregnated with sulphur-35; technique permits permanent marking of larvæ for release-recapture experiments. [P. B.]

Loebel, Friedrich, "Auffinden und Bestimmung von Psychiden" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.32: pp.20-22. 15 Apr. 1948. Collecting methods for Psychidæ [P. B.]

Ortner, Anton, "Aus der Praxis des Entölens von Lepidopteren" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol.31: pp.172-179. 15 Mar. 1948. Describes technique for restoring greasy specimens. [P. B.]

Robinson, H. S., "The use of anæsthetics in funnel mercury-vapor insect traps." *Entomologist,* vol.85: pp.97-101. May 1952. Recommends use of tetrachlorethane, in concentrations sufficient to anesthetize but not kill specimens. [P. B.]

Smith, Kenneth M., & Ralph W. G. Wyckoff, "Electron microscopy of insect viruses." *Research,* vol.4: pp.148-155, 16 figs. April 1951. Technique and results of study of infected caterpillars. [P. B.]

Tarasevich, L. M.,"Rearing Mulberry Silkworms free of yellow jaundice" [in Russian]. *Mikrobiologiia,* vol. 19: pp.364-368. 1950. [Not seen.]

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For exchange or sale: SERIES OF *PARNASSIUS* from each catching place, with precise data, including altitude and time caught. Write offers to Curt Eisner, 5 Kwekerijweg, The Hague, NETHERLANDS.

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Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.,* wing venation, mimicry, moth traps); 2) papers on pre-adult stages, genetics, comparative taxonomy (descriptions of new species and subspecies will be accepted); 3) field notes of more than a very local nature; 4) notes on well-tested techniques. Papers of more than ten pages will not normally be accepted.

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Address Society correspondence to: Dr. F. H. RINDGE, Dept. of Insects & Spiders, American Museum of Natural History, New York 24, N. Y., U. S. A.

Address remittances to: Mr. S. A. HESSEL, Nettleton Hollow, Washington, Conn., U. S. A.

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THE LEPIDOPTERISTS' NEWS

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A GUIDE TO COLLECTING THE PLANT-BORING LARVÆ OF THE GENUS *PAPAIPEMA* (NOCTUIDÆ)

by SIDNEY A. HESSEL

The prime purpose of this paper is to offer selected data in simple and readily referable form in order to stimulate Society members to embark upon the study of the fascinating and beautiful North American noctuid genus, *Papaipema* Grote. There is very much remaining to be learned and reason to believe that undiscovered species still await careful and fortunate workers; this is probably especially true in the western states.

No attempt has been made to cover the widely scattered literature for all of the facts. The fine original papers of the pioneer workers in the field must be read to learn the intimate details of the respective species and to appreciate the thousands of hours of search, keen observation, and painstaking labor necessary for their discovery. Although the material in this presentation is assembled in part from these, it is more particularly compiled from direct notes contributed for use in this paper by HENRY BIRD, OTTO BUCHHOLZ, FRANK MORTON JONES, ROY LATHAM, JOSEPH MULLER, and ALEX K. WYATT. Their splendid and prompt co-operation is most gratefully acknowledged. Included among these contributors are the authors of most of the original papers referred to. The very extensive published material of HENRY BIRD stands at the head of the *Papaipema* literature.

It was not until this paper was near completion that an article strikingly similar in purpose and contents, published by Mr. WYATT (1916), nearly forty years ago, was brought to my attention. In view of the elapsed time and the comparative unavailability of the earlier publication it was nevertheless considered desirable to complete the project in its new form.

Species are not included in the table when little or nothing is known of the early stages. A complete taxonomic list, with authors' names, is available in McDunnough's "Check List" (1938). The known range of the species is also omitted because of the concentration of records at favorite collecting points of the relatively few workers, the difficulty of examining and compiling the fragmentary information, and the certainty of wide extension of known ranges as a result of new work. Dyar's *List* (1902) offers considerable information on distribution but much has been added since then. It also furnishes the source of the original descriptions of most of the species. In general, a species should be looked for anywhere in the range of its food

SPECIES	FOOD PLANT	EVIDENCE OF PRESENCE	POSITION OF LARVA	POSITION OF PUPA	DATES OF PUPATION	DATES OF EMERGENCE
P. appassionata	PITCHER PLANTS (all *Sarracenia*)	Orange frass	Root; to new root in July	Root or soil near plant	Aug.1-10	Sept.15
P. araliæ	HERCULES' CLUB (*Aralia spinosa*)	Bored new growth; withered leaves; dead branch	Stem tip, new growth	Soil	Aug.10	Oct.1
P. arctivorens	THISTLE(*Cirsium* spp.), BURDOCK(*Arctium lappa*)	Thistle: branching below crown or crown black; frass	Stem	Soil	July 20-Aug.20	Aug.5-Oct.5
P. astuta (*verona* may be form)	HORSE-BALM, STONEROOT (*Collinsonia canadensis*)	Dry stem; white frass	Stem, later cell in root	Soil	Aug.1-10	Sept. 12-24
P. baptisiæ (*circumlucens* may be same)	WILD INDIGO(*Baptisia tinctoria,B.alba*), INDIAN PLANTAIN(*Cacalia tuberosus*), DOGBANE (*Apocynum*)	Discolored foliage; frass; holes in stem; sometimes fallen plant	High in stem to upper root	Burrow if plant large, soil if small	Aug.1-Sept.10	Aug.16 Oct.16
P. beeriana & f."lacinaria"	SNAKEROOT(*Liatris pycnostachya spicata*)	Wilted tip or brown and dry leaves	Lower stem, root crown	Burrow or near root	Aug.10-Sept.5	Sept.6-Oct.16
P. cataphracta & f."sulphurata"	Esp. BURDOCK (*Arctium*), THISTLES, LILIES, *et al.* (26 spp. on L.Is.-LATHAM)	Plants stunted, drooping, discolored; swelling; much frass	Stem, at maturity near ground	Stem (sometimes root)	Aug.10-Sept.25	Sept.8-Oct.15
P. cerina	TURK'S CAP(*Lilium superbum*), *et al.**	Small hole; drying or dry stem; little frass	Stem	Burrow	Aug.5-25	Aug.30-Oct.14
P. cerussata	IRONWEED(*Vernonia noveboracensis*)	Plant stunted, broken, or bent at larval entrance; top may be much branched from later boring below	Stem(early) to root	Soil, 2"-12" from root	Aug.10-	Sept.5-15

P. duovata (usually lays 2 eggs)	SEASIDE & LATE GOLDENROD (*Solidago sempervirens, S. gigantea leiophilla*)	Several openings in stem; often whitish frass on sand	Stem (early) to root	Burrow	Aug.15-	Sept.15-Oct.20
P. duplicata	HORSE-BALM, STONE-ROOT (*Collinsonia canadensis*)	Wilted leaves or dry stem; sometimes white frass	Stem (early) to root	Root	Aug.15-	Sept.30-Oct.28
P. eryngii	BUTTON SNAKEROOT (*Eryngium aquaticum, E. yuccifolium*)	Little or none; yellow or dead leaf; bored	Leaf or stem (early) to root	Burrow in root	Aug.15-30	Sept.10-Oct.15
P. eupatorii	JOE-PYE-WEED (*Eupatorium purpureum*)	Leaning stem usually still living; sometimes frass	Stem to root	Burrow at base	Aug.5-Sept.5	Sept.12-Oct.5
P. frigida	JACOB'S LADDER (*Smilax herbacea*), MEADOW RUE (*Thalictrum revoltum*)	Slightly dwarfed plant; stem yellowed or bending; hollow stem always blackened	Tip of stem (early) to root	Soil,1"-15" from plant, ½"-3" deep	Aug.10-Sept.15	Sept.1-Oct.10
P. furcata	RED, WHITE, & BLACK ASH (*Fraxinus pennsylvanicus, F. americana, F. nigra*)	Dry branch or blackened tip of shoot; clean hole to later burrow in older growth	First in new growth, later in near wood	Soil	July 30-Aug.25	Aug.24-Sept.20
P harrisi	COW PARSNIP (*Heracleum maximum*), ANGELICA (*Angelica atropurpurea, A. lanatum*)	Yellow or wilted leaf in *Heracleum;* drooping stem in *A. lanatum*	Leaf stem to root crown	Soil	July 15-22	Aug.8-Sept.25
P. impecuniosa	ASTER (*Aster punicius, A. umbellata*), SNEEZE-WEED (*Helenium autumnale*)	Large opening for moth	Lower stem to root	Base of stem or root	Aug.15-Sept.10	Sept.10-Oct.15
P. inquæsita & f. "wyatti"	SENSITIVE FERN (*Onoclea sensibilis*)	Yellow, brown to dry stem, hole at entry; orange frass	Stem (early) to root	Root	July 20-Aug.15	Sept.1-Oct.1

SPECIES	FOOD PLANT	EVIDENCE OF PRESENCE	POSITION OF LARVA	POSITION OF PUPA	DATES OF PUPATION	DATES OF EMERGENCE
P. limpida (=*ærata*)	BURDOCK (*Arctium*)	Wilted branch	Lower stem		July 15	Aug.24-Sept.6
P. lysimachiæ	LOOSESTRIFE (*Lysimachia quadrifolia*, rarely *L. terrestris*)	Yellow, brown or dry stem	Stem (early) to root	Soil, 2″-15″ from plant, ½″-3″ deep	Early Aug.-Sept.15	Sept.1-Oct.1
P. marginidens (=*birdi*)	WATER HEMLOCK (*Cicuta maculata*), WATER PARSNIP (*Sium suave*), other umbellates	Bending or fallen top, or branch at point of entrance	3′ from ground to root	Soil, 4″-20″ from plant, 1″-2″ deep	Late July-Sept.5	Early Aug.-Oct.16
P. maritima	GIANT SUNFLOWERS (*Helianthus giganteus*, *H. lætiflorus*)	Frass and gall-like swelling; stem may be broken at top of burrow; pupa near hole	Base of stalk	Base of stalk (in gall)	Aug.15-Sept.2	Sept.5-Oct.20
P. merrickata	MAY APPLE, MANDRAKE (*Podophyllum peltatum*)	Yellow leaf and much frass	Root	Soil	Aug.10-Sept.5	Sept.7-Oct.5
P. nebris & f. "nitela"	General feeder, esp. RAGWEED (*Ambrosia artemisiifolia*), BURDOCK (*Arctium*)	Swellings or galls; holes in stem	Lower stem	Burrow or soil	Aug.10-mid-Sept.	Sept.5-Nov.10
P. necopina (=*imperturbata*)	SUNFLOWER (*Helianthus divaricatus*), INDIAN PLANTAIN (*Cacalia tuberosus*)	Elongate enlargement or gall at base	Stem to root	Root burrow or soil	Aug.5-30	Sept.9-20
P. nelita	TALL CONEFLOWER (*Rudbeckia laciniata*)	Gall	Base or root	Soil	July 20	Sept.1-15
P. nepheleptena (=*moeseri*)	TURTLEHEAD (*Chelone glabra*)	White frass	Stem	Soil	Aug.10-15	Oct.1

P. nephrasyntheta	BUTTON SNAKEROOT (*Eryngium yuccifolium*)	Yellow leaf; brown frass	Root	Burrow	Aug.15	
P. ochroptena (=*humuli*)	HOP(*Humulus lupulus*)	Cigar-shaped gall	Stem	Soil	(retrieve larva July 20)	Aug.15
P. polymniæ	LEAFCUP (*Polymnia uvedalia*)	Irregular swelling	Mid-stem to base	Soil	Aug.5-10	Sept.2-23
P pterisii (=*triorthia*)	COMMON BRAKE (*Pteridium aquilinum*)	Yellow or brown frond; orange frass	Stem to upper root	Soil near root	July 25-Aug.15	Aug.7-30
P. purpurifascia (=*luteipicta*)	COLUMBINE(*Aquilegia canadensis* and other *A.* spp.	Wilted plant; frass	Root(often needs two)	Soil	July 15-Aug. 15	Sept.1-19
P. rigida	GOLDEN ALEXANDERS (*Zizia aurea*), OX-EYE (*Heliopsis helianthoides*), SUNFLOWER (*Helianthus strumosus*)	Holes in stem near base; slight swelling; frass	Stem (early) to root	Soil	July 25-Aug.20	Aug.30-Oct.11
P. sciata	SPEEDWELL (*Veronicastrum virginicum*)	Dry, black, dead stem, sometimes broken; frass	Long roots	Soil	Aug.10-Sept. 10	Sept.10-Oct.10
P. silphii	PRAIRIE DOCK, ROSIN-WEED, CUP-PLANT (*Silphium* spp.)	Brown leaf or two; frass	Root	Soil	Aug.1-30	Sept.16-Oct.20
P. speciosissima	CINNAMON, ROYAL, INTERRUPTED FERN (*Osmunda cinnamomea, O. regalis, O. claytoniana*)	Yellow(June) to dry (Aug.); frond bends as larva matures; frass	Stem through root stock	Burrow or fibres of root	Aug.10-	Aug.25-early Oct.
P. stenoscelis	CHAIN-FERN(*Woodwardia virginica*), N.Y. FERN(*Dryopteris noveboracensis*)	Brownish to dry frond; orange frass	Stem (near tip of frond) to root	Soil	Aug.15-Sept.15	Sept.10-Oct.10

*Small larvæ have been found in STARRY CAMPION (*Silene stellata*), MAY APPLE (*Podophyllum peltatum*) feeding upward, and quite commonly in BOTTLE-BRUSH GRASS (*Hystrix patula*); will mature in iris but require several stems; will not enter root. —WYATT

plant. Such information is easily obtainable from the popular botanical handbooks. Latin plant names follow *Gray's Manual of Botany,* 8th Edition, 1950, by Fernald. Common names are from the same source if available, otherwise from Britton & Brown, *Illustrated Flora of Northern U. S. and Canada.* The best colored plates of *Papaipema* imagoes are to be found in the works by Seitz (1930) and Hampson (1910), especially the former.

As the field work forming the basis of the data was accomplished primarily in the states of the East and Middle West, the material is, of course, representative primarily of that area. Its usefulness need not be so restricted, however, as the patterns indicated with respect to the various types of plants may be projected to similar species in the search of any flora for the tell-tale signs of *Papaipema* presence. If not the same species, at least most of the genera of host plants mentioned are represented across the country as well as in many other parts of the world and are worthy of particular attention in starting the search for *Papaipema.* The dates, compiled as they are, from data of different years, originating over a wide and diverse area and including observations under other than undisturbed natural conditions presumably show a considerably wider range than would likely be experienced in any given locality in a single or even many years.

Collecting equipment may be very simple; almost essential, however, are a narrow trowel, preferably sharpened on the edges, and a stout pocket knife. Glass or tin containers and carrying apparatus are necessary. The collector will vary these according to taste and experience and whether or not transportation is readily at hand for heavier loads. Plants must be kept fresh. Often they may be potted (paper pots are handy) and loaded in a car almost on the spot. If material, especially large roots, must be carried along on foot a vasculum is helpful. Sphagnum moss, sometimes at hand in the field, or brought along, is very useful in maintaining a moist condition.

In general, *Papaipema* larvæ may be recognized when young by their dark ground color with dorsal and sub-dorsal white lines; later they become translucent with the markings very faint or absent. Because of the difficulty in keeping many species of food plants fresh it may be desirable to permit the larvæ to develop in their natural habitat as long as possible. Plants may be marked in the field and collected at a later date. It often happens in the course of examining a plant and finding a larva that it is disturbed and leaves its burrow. WYATT (1916) points out that an attempt to induce it to return is a waste of time. From my much more limited experience I can confirm this. He offers the ingenious solution of placing the individual larva in a narrow tube which may be placed over the end of a new plant, obliging the larva to cease its exhausting wandering and to enter and feed at a proper position. For those species pupating in burrows care must be taken that drying and shrinking plant tissues do not pinch or crush the pupa. The latter may be removed for safety and placed on a moist sphagnum bed or, if the plant is maintained in fresh condition, they may, of course, be left undisturbed.

Failure to locate larvæ in a good development of food plant may often be explained by the burning over of the area sometimes as long ago as

fifteen or twenty years. ROY LATHAM points out with respect to *P. frigida* that mice at times almost annihilate a colony, especially if it had been a particularly heavy infestation. This may also apply to other species. Parasites, too, take their toll, but these should be considered prizes reared out carefully, and passed along to competent authorities.

Late July is the best season to begin your search. Be alert to anything queer about the condition of a plant, look for further clues, close in on the culprit, and sentence him to life imprisonment; and don't forget that notebook! Besides a contribution to lepidopterology it is likely that you will find the work the most fascinating form of "whodunit" you have yet experienced.

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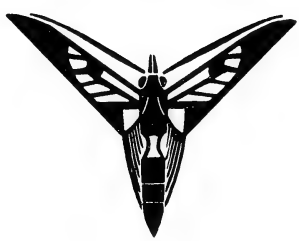


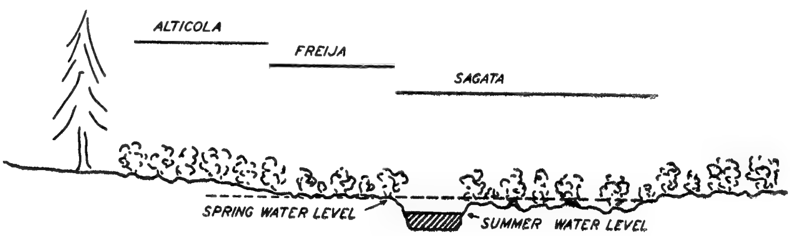
SOME NOTES ON *BOLORIA* IN CENTRAL COLORADO (NYMPHALIDÆ)

by F. MARTIN BROWN

Six species of *Boloria* are found in Colorado, and there is the possibility that three others fly in the state but as yet have not been discovered. To avoid nomenclatorial confusion while awaiting KLOTS' promised revision of the genus I use here the names for species accepted by MCDUNNOUGH in his 1938 Checklist.

Boloria myrina (=*selene*) *tollandensis* Barnes & Benjamin

My experience with this insect is limited to three areas and all-too-brief collecting. The butterfly is on the wing early in July and by the last week of the month is in rather shabby condition. It seems to prefer open grassy meadows much like those in which its eastern counterpart flies. Altitudinally it seems to be narrowly restricted to a few hundred feet, either way, from 9000 feet. I know of colonies in the Front Range north of the South Fork of the Platte River, the Park Range, the Collegiate Range, and the Rabbit-ears Range.



DISTRIBUTION OF COLORADO WILLOW-BOG *BOLORIA*.

Boloria aphirape alticola Barnes & McDunnough

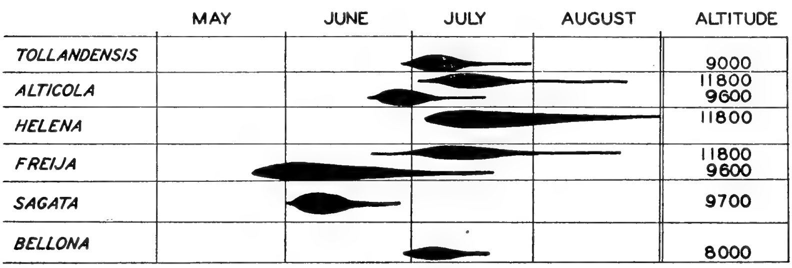
This is one of three species closely associated with willow bogs in Colorado. There is good reason to believe that it flies in all of the mountain ranges of the state, although I have not seen specimens from the Sange do Cristos. It first appears during the last week of June in bogs around 9600 feet, and the last specimens to be taken are found at about 12,000 feet late in August. Of the June *Boloria* in Colorado this one is found on the driest ground. At times it abounds in the hummocky areas where a willow bog is drying out. Elsewhere it is found rather sparsely along the edges of the bog where it invades the dry grasslands for a few yards. Its bright reddish upper surfaces and its swift erratic flight immediately set it apart from the

other species, *B. frigga sagata* and *B. freija,* often found with it around 9600 feet.

During the last week in June when the three fly together it is very clear that they prefer different parts of the bog. The wettest part is the home of *B. sagata,* the driest of *B. alticola,* with *B. freija* occupying an intermediate zone. As the stream cuts its channel deeper and the bog starts to dry out, *B. sagata* disappears.

Boloria helena helena Edwards

This is the last of the Colorado *Boloria* to take to the air. It is found throughout the mountains of the state, rarely below 10,000 feet and often as high as 12,500. It roams the grasslands above timber and more than any other Colorado species of the genus may be found considerable distances from water or bog. Its flight is moderately strong and rather direct. It appears at the lower extreme of its altitudinal range early in July and flies until killing frosts occur late in August.



TEMPORAL DISTRIBUTION IN CENTRAL COLORADO

Boloria freija browni Higgins

The first of the mountain butterflies to appear in the spring as the snows melt is either *B. freija* or *Glaucopsyche lygdamus oro* Scudder. I have always found them together when nothing else is flying. Whereas with the other *Boloria* the females emerge soon after the males, with *B. freija* there may elapse as much as two weeks between the first emergences of the sexes. Like *B. alticola* this insect is found most abundantly in willow bogs. There it occupies the middle zone of bog that is underlain with sphagnum but rarely fully flooded by the spring freshets.

At about 9500 feet the insect appears during the last week of May, and as the season progresses fresh material continues to fly at higher and higher altitude until during the first week of July it appears at about 12,000 feet. By the middle of August the butterfly has disappeared throughout its altitudinal range. Wherever and whenever it is found, it has a swift direct flight. Its duller color is quite noticeable on the wing. Long-flown specimens are faded to almost ochre and black.

Boloria frigga sagata Barnes & Benjamin

Soon after *B. freija* is flying *B. sagata* puts in its appearance. Unlike *B. freija* which is found in all of the mountains of the state, *B. sagata* thus far has been found only in the heart of the Colorado Rockies. A chain of colonies is known reaching from the Rocky Mountain National Park to Tennessee Pass. The butterfly is most abundant in the Park Range that separates Middle from South Park. Altitudinally it is found from about 9500 to 11,000 feet. Its present distribution suggests that at one time in the near past it ranged high enough to cross the Continental Divide at Hoosier Pass. Such a period of warmer conditions is postulated by paleo-climatologists about 6,000 years ago. Much more collecting must be done in Middle Park bogs before anything of importance can be drawn from the distribution of this arctic insect.

To collect *B. sagata* it is necessary to be prepared for wet feet in icy water. The beast roams the wettest parts of the willow bogs where the spring high water floods the sphagnum floor. Its flight is rather slow and direct, quite unlike that of either *B. freija* or *B. alticola* found with it in the same bog. The best method is to perch on a willow hummock and catch those that fly by. Travel in the bog is too hazardous and slow to attempt to chase even these slow-flying insects. The accompanying profile of a typical willow bog shows the areas of concentration for the three species usually found at the same locality late in June.

Boloria bellona Fabricius (=*B. toddi* Holland)

In North and Middle Parks and near Aspen are small colonies of this eastern butterfly. All records of *B. epithore* for Colorado that I have been able to trace to the insect have proven to be *B. bellona.* It is found around 8000 feet in aspen-shaded boggy land - a rather rare combination! From these centers the butterfly strays a short distance onto the adjacent sage-flats where its appearance is startling. Its rather gentle flight makes it an easy mark for the net. The first week in July seems to be the best time to hunt it.

Fountain Valley School, Colorado Springs, Colo., U. S. A.

CONSIDERATIONS ON THE TERMINOLOGY OF THE GENITALIA IN LEPIDOPTERA

by A. DIAKONOFF

The following considerations and suggestions are the result of a study of the terminology of the genitalia in Lepidoptera in order to prepare a contribution to the "Taxonomists' Glossary of Genitalia in Insects" soon to appear. The editor, Dr. S. L. TUXEN, of Copenhagen, kindly allowed me to publish the following notes separately.

RAMBUR apparently was the first lepidopterist to realize the paramount importance of the characters of the skeletal parts of the genitalia for taxonomy; he was the first to use distinct terms for these parts, and to publish his conclusions, concerning southern European Hesperiidæ, as long ago as 1842. It is to be regretted that at present his publication is very rare, and consequently is so little known.

During the more than one hundred years that followed, slowly but gradually the realization of the importance of these characters became general, and at present there are few lepidopterists who would deny this importance or leave these characters out of consideration. An enormous mass of scattered data on the morphology of the genitalia has accumulated, and is continuously increasing. Soon special terms were needed for the description of these structures, and these terms were lavishly created. Generally the study of the genitalia was only an accessory to classification. Every individual investigator would use genital characters without having acquired a proper knowledge of the earlier literature on the subject and of its terminology, simply because previous publications concerned the classification of groups in which he was not directly interested. Thus everybody used to create his own terms as soon as he needed them. Or some paper received unduly wide general attention, and its terminology was followed by other authors during a long time, without its correctness ever having been probed or the possibility of an application of this terminology to a different group of Lepidoptera having been considered. Often subsequent authors erroneously applied previously published terms, by failing either to identify correctly the parts concerned, or simply to read properly those previous publications.

Sometimes one failed to discriminate between the main parts, which, of course, deserve special terms to facilitate description, and the minor structures, which often are complicated, and exceedingly diverse in different groups, and better might remain nameless. Consequently, numerous arbitrary terms have been created for similar minor structures, and these structures were homologized in different groups of Lepidoptera, without any apparent right or reason. It is noteworthy that the less an author was acquainted with the morphology of the genitalia of the group studied by him, the more he seemed to have an urge for the creation of new terms for every structure observed by him; later he often would abandon many of his original terms.

There have been quite a few lepidopterists who published general essays on the subject or tried to summarize the data known at that time. However important some of these papers are, they are either chiefly concerned with ontogeny of the genitalia and with problems of general comparative anatomy (Zander, 1903; Petersen, 1904; Eyer, 1924; Beirne, 1942, 1944; etc.), or represent historical and bibliographical reviews (De Graaf, 1901; Van Eecke, 1915; Viette, 1948). Little attention was paid to a critical examination of the terminology of the genitalia and to compiling a practical list of terms for general use, except by BUSCK and HEINRICH (1921), whose paper is incomplete, and by KUSNEZOV (1915), whose excellent study is in Russian and therefore did not get the attention it deserved.

In view of these facts it is not at all surprising that the terminology of the genitalia in Lepidoptera became chaotic; it apparently is in a worse state of confusion than in any other order of insects. Meanwhile recognition of these characters as an indispensable means of modern taxonomy has become general. Therefore the creation of some order in the already existing terminology and the prevention of further confusion is desirable. The publication before long of the first glossary of genital terms seems to be a suitable opportunity for such endeavour.

Fortunately our problem is less desperate than one might suspect. This is chiefly owing to the monumental studies of the late F. N. PIERCE, who actually was our only "specialist of genitalia", because he studied the genitalia primarily from a morphological point of view. He acquired a greater general knowledge of these structures throughout the order than any other author before and, possibly, up till now after him. Thanks to his well-merited authority the principal part of his terminology already is generally accepted by most taxonomists. Owing to the sound judgement of the most of them the weaker parts of PIERCE'S taxonomy (viz., superfluous terms of his first publication of 1909) have been left out of account. Thus one safely can state that the greatest confusion dates from before and not from after PIERCE'S studies. In order to reach definitive stability it seems sufficient to fixate in some way the now accepted views. But there also are lepidopterists who are inclined to apply a dangerous procedure, the rule of priority in terminology, by trying to substitute obsolete and unfamiliar terms for the generally accepted and familiar ones. And there still are a few who continue to create new superfluous, and often synonymous, terms for every structural detail.

In order to contribute to a "sanitation" of the terminology of the genitalia in the Lepidoptera I here present a few suggestions for the use of certain terms, for consideration by fellow taxonomists, and wish also to warn against the two last mentioned methods, viz., the application of the rule of priority, and the creation of new terms for minor structures. My ideas are neither revolutionary, nor entirely new, as in formulating them I tried as much as possible to follow the modern general usage. Moreover, some of these views have already been expressed, although perhaps less emphatically, by KUSNEZOV (1915).

Four suggestions, concerning, in my opinion, the most important problems of terminology, are given below, accompanied by examples and discussions.

(1) **Latin, latinized or not latinized Greek terms, instead of barbarous terms, should be used for dènoting those parts of the genitalia that deserve a special terminology.** Only Latin or latinized terms are international; therefore they are to be preferred for establishing stability and uniformity, to any barbarous denominations, in any other language. Of all the terms examined by me there are only a few that appear to have no already existing Latin or Greek equivalents. Carrying into execution of this recommendation would therefore not meet with difficulties.

Examples: *valva* (plur. *valvæ*) Rambur 1842, should be used, instead of "clasp" or "clasper" (English), "valve" (French), "Klappe" (German), etc.; for similar reasons the term *papillæ anales* Kusnezov 1915, is preferable to "lobes of the ovipositor", "Afterklappen", "flaps", etc.

(2) **The rule of priority in terminology of genitalia should most emphatically be relinquished, as its application unavoidably results in a great confusion.** The following notorious example of confusion in terminology may illustrate the dangers of the application of the rule of priority. In 1881 and 1883 GOSSE published two papers on the male genitalia of Rhopalocera. However elegantly styled and handsomely illustrated (the second paper), they contain serious errors, due to the crude working method of the author (maceration of chitin and sclerotin with KOH not being known at that time, the genitalia were inspected in dry and shrivelled condition, after one *valva* having been removed "with a sharp pen-knife"). Starting with certain Papilionidæ GOSSE correctly described a curved dorsal process of the eighth abdominal segment, and termed it *uncus;* he stated, however, that the *valvæ* articulate with the eighth segment, which is, of course, erroneous. When further studying other species of the Papilionidæ, and species of other families of Rhopalocera, he indicated dorsal processes of a similar shape, with the same term, *uncus,* not noticing, however, that these processes were now attached not to the eighth, but either to the ninth or to the tenth tergite! Curiously enough, most subsequent authors were not aware of this error to the present day. Only SCUDDER (1889) used GOSSE'S term *uncus* in a correct sense (*i.e.,* to indicate an apophysis of the **eighth** abdominal tergite), but this usage remained unnoticed. All subsequent authors who used the term "uncus Gosse" applied it to the apophysis of the tenth abdominal tergite! Finally, KUSNEZOV (1915) unravelled this tangle by a reexamination of some of GOSSE'S species but, unfortunately, his Russian paper did not attract general attention either, as was already remarked above. (Cf. fig. 1)

It is evident that great confusion would result from an application of the rule of priority to GOSSE'S terminology. The generally accepted term *superuncus* Kusnezov 1915, denoting an unpaired dorsal apophysis of the eighth tergite, would have to be changed in *uncus* Gosse 1881. The familiar term *uncus* (*sensu* Peytoureau, 1895), now in general use for what is regarded by most authors as the tenth tergite (by a few, the apical appendage of the

ninth tergite), would have to be changed to some other term; those who are fortunate to be able to consult the rare first paper of RAMBUR, mentioned in the beginning of the present paper, would have to choose for this well-established term (*uncus*) the antedating term *sicula* Rambur 1842, which is hardly known, but those who ever bothered to read the classic "Dissertatio epistolica de Bombyce", would have to propose the term *unguis* Malpighi 1669, which is largely unknown! The notorious term *scaphium* Gosse 1883.

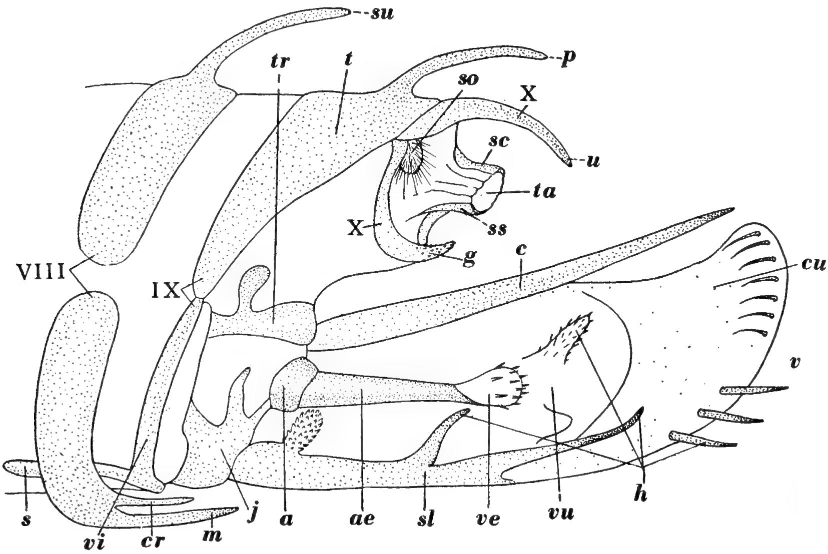


Fig. 1. Diagram of the male genitalia of a lepidopteron, in lateral aspect, with the right *valva* removed. Latin numerals denote the generally accepted homology of the abdominal segments; names and years denote the first author either to create the term or to use it in its generally accepted modern sense: *a* = ***anellus*** Pierce 1914; *ae* = ***ædœagus*** Pierce 1914; *c* = ***costa*** Pierce 1914; *cr* = ***ceratum*** Pierce 1909; *cu* = ***cucullus*** Pierce 1909; *g* = ***gnathos*** Pierce 1914; *h* = ***harpe*** Kusnezov 1915 (compound term denoting the complex of structures of the inner side and the margin of the *valva); j* = ***juxta*** Pierce 1914; *m* = ***mappa*** Pierce 1909; *p* = ***pseuduncus*** Spuler 1910; *s* = ***saccus*** of modern authors (not *saccus* Baker 1891, which means *saccus* + *vinculum*); *ss* = ***subscaphium*** Pierce 1909; *sc* = ***scaphium*** Pierce 1909 (not *scaphium* Gosse 1883, as originally *tegumen* was denoted with that term!); *sl* = ***sacculus*** Pierce 1914; *so* = ***socius; su*** = ***superuncus*** Kusnezov 1915 (*uncus* Gosse 1883!); *t*= ***tegumen*** Pierce 1909; *ta* = ***tuba analis*** (latinization of "anal tube" Pierce 1914); *tr* = ***transtilla*** Pierce 1914; *u* = ***uncus*** Peytoureau 1895; *v* = ***valva*** Rambur 1842; *ve* = ***vesica*** Pierce 1909; *vi* = ***vinculum*** Pierce 1909; *vu* = ***valuvla*** Pierce 1914.

applies in the above example to nothing else but the *tegumen* (the ninth tergite), while with this now well-established and familiar term in the sense of PIERCE (1909), the dorsal sclerite or sclerites of the anal tube (*tuba analis*) are indicated.

Thus, disadvantages of the application of the rule of priority are evident. Furthermore, as it is impossible to review all the existing literature on the

genitalia at once, subsequent exhumation of obsolete terms would necessitate a revision of terminology. Change of opinion of modern authors as to the meaning of a certain old term (as in the example in GOSSE'S papers) would have the same result. Finally, a study of the history of terminology, a terminology committee, a code of terminology rules, etc., would be needed.

When abstaining from the rule of priority it is clear that another directive is needed. (3) **PIERCE'S terminology is here proposed for general use, after deletion of certain superfluous terms** (see *sub* 4).

Since PIERCE was the specialist on this subject who contributed most to our knowledge of the genitalia in Lepidoptera, and since his terse and handy terms are already accepted by most taxonomists, a recommendation of these terms as a fundament of a revised terminology seems to be only natural. However, some of PIERCE'S early terms (of 1909), abandoned by himself later, are superfluous, for which matter I refer to the following suggestion. Example: *signum* (plur. *signa)* Pierce 1914 should be used instead of *lamina dentata* (plur. *laminæ dentatæ)* Petersen 1904.

(4) **Certain minor details of structure of the genitalia should not be denoted with special Latin or Greek terms, but their complex should be indicated by a compound term only, and, if necessary, these details should further be described in the language of the concerned paper (i.e., not Latin, nor Greek); this in order to prevent confusion and overburdening of terminolgy by superfluous terms; already existing Latin or Greek terms for similar minor structures should be neglected.**

As already remarked above, certain parts of the genitalia in the male, and in the female, often show a great plasticity, resulting in a development of complicated "armatures". A comparison of more or less similar structures of this kind in different species, and erecting of their homologies might sometimes be tempting but generally is entirely problematic and therefore useless, confusing, and objectionable. And since the homology of similar structures cannot at present be ascertained, denoting each of them with an arbitrary Latin or Greek term is undesirable, often resulting in confusion. As an example of such a confusion is the arbitrary term *fibula* used by BASTELBERGER (1900) for a sclerotized process of the postero-median portion of the inner side of the *valva,* directed upwards and outwards, in *Zonosoma;* by SCHRÖDER (1900) for a clavate and hairy apophysis of the *transtilla,* in *Eupithecia;* by JOHN (1910) for a clavate and hairy apophysis but of the medio-dorsal portion of the inner side of the *valva,* in *Leucanitis;* and finally, by ROEPKE (1938) for a long, rod-like apophysis with a split top, of the *anellus* or of the *juxta,* in *Kallima.* Fortunately the majority of modern taxonomists have already abandoned many of the superfluous terms of this kind, so that also this suggestion is suitable for general usage.

There are several "plastic" areas in the genitalia of the Lepidoptera, but only three of them need to be considered here, forming an especially fertile ground for the making of terms. They are the following.

(a) The inner surface and the margins of the *valva* in the male which may be ornated with processes, crochets, teeth, combs, ribs, brushes of modified hairs, etc. I suggest to denote this entire complex with the compound term *harpe* (Gosse, 1881, in the sense of Kusnezov, 1915), and describe the peculiarities with barbarous (*i.e.,* not Latin nor Greek) terms. By this procedure the following 24 Latin or Greek terms may be cancelled: *ampulla,* "antistyle", *brachiola, cercina, clavus, clinopus, clunicula, conus, corona, crista, crista obliqua, digitus, editum, fibula, flagellum, forceps, lobulus basalis, penicillium, peniculus, pollex, processus inferior valvæ, processus superior valvæ,* "pseudostyle", and *pulvinus.*

(b) The sclerites and their apophyses of the *diaphragma* in the male. I suggest to denote the entire complex of these structures with the compound term *fultura penis* (Petersen, 1904), to discriminate three portions only, and to denote these with PIERCE'S terms (1914), as follows: the portion above the *ædœagus* with the term *transtilla,* that around the *ædœagus* with the term *anellus,* and that below the *ædœagus* with the term *juxta.* Sometimes these parts are not sufficiently differentiated; in that case it may be useful to discriminate the dorsal and the ventral portions of the *diaphragma* only; then PETERSEN'S terms (1904), *fultura superior* and *fultura inferior,* are recommended for general use. The following 18 Latin terms then become superfluous: *brachium, bucina, calcar, canaliculus, collare, crista, ductus inferior penis, ductus superior, ductus superior penis, fibula, fulcrum, furca, labis, lamina præputialis, sternellum, suspensorium trulleum,* and *vallum penis*[1].

(c) Sclerites of the region of the *ostium bursæ* in the female. My suggestion is to denote the entire complex of these structures with the compound term *sterigma* Bryk 1918. Although less generally used till now, this term is, to my knowledge, the only latinized term available. Only two portions of this complex, if necessary, might be denoted with special terms, viz., the portion situated rostrad (ventrad) of the *ostium bursæ* with the well-known term *lamella antevaginalis* Kusnezov 1915, and the portion caudad (dorsad) of the *ostium bursæ* with the term *lamella postvaginalis* Kusnezov 1915. The following Latin terms could then be cancelled: *director penis, instita, lobuli vaginales, pars subvaginalis,* and also a series of confusing barbarous denominations, as, *e.g.,* "antevaginal plate", "genital plate", "plate of ostium", "postvaginal plate", "Subvaginalplatte", "terminal plate", "vaginal armature", etc.

The diversity of these structures is considerable (fig. 2), and though a relatively small number of terms have been used for them up till now, it is to be feared that many new terms might be invented in future. My suggestion is meant as a precaution against such a policy.

The above suggestions cover only a few problems of terminology, although, in my opinion, they are the most important. It is, of course, hardly

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[1]I make an exception for the term *caulis* Obraztsov 1949, denoting a vertical sclerite which connects the *anellus* with the *juxta;* this term is very useful for descriptions of genitalia in Tortricoidea.

practical to present prescriptions for the use of every existing term. Perhaps the best advice for the choice of terms for parts that are not mentioned here, is, as much as possible, following the now established usage; the use of the "Glossary", after having taken counsel with colleague taxonomists; inclusion in publications of figures and of explicit legends of the terms used, and, above all, caution with and economy in the description of new terms.

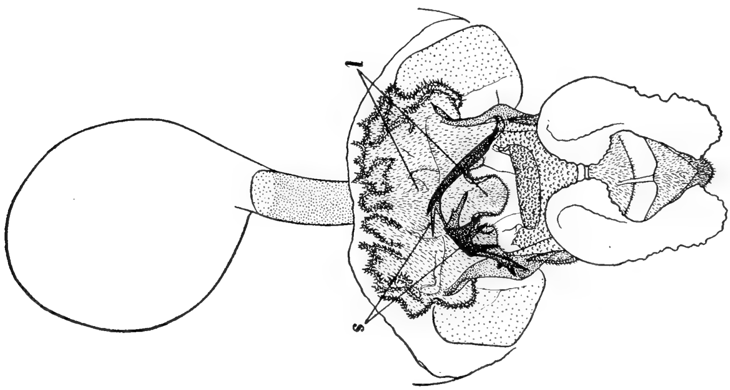

Fig. 2. Female genitalia of *Schœnotenes pachydesma* Diak. (Schœnotenidæ), as an example of complicated structures in the region of the *ostium bursæ*: ***l*** = ***lodix*** Pierce 1909 (modified posterior edge of the seventh abdominal sternite); ***s*** = ***sclerites*** of the ***sterigma*** Bryk 1918 (elements of the intersegmental membrane between the seventh and the eighth abdominal sternites). After DIAKONOFF (1954).

Finally I wish to stipulate that the terms for genitalia dealt with in the present paper are those as used in taxonomy. Another category of terms, those of the pure comparative anatomy (as, *e.g.*, gonopodes, parameres, cerci, styli, etc.), was entirely left out of consideration. In 1950 and 1952 a French hemipterist, DUPUIS, published interesting suggestions, when proposing a simplification of the terminology of the genitalia in insects through the substitution of taxonomic terms by those used in comparative anatomy. Without doubt, such a procedure would be beneficial, were it practical. Perhaps this method may lead to good results in the order Hemiptera, in which DUPUIS is especially interested. But for the terminology of the genitalia in the Lepidoptera this suggestion is, alas, exceedingly little promising. It is a fact that the study of the morphogenesis of the genitalia in this order is in a puerile stage. Some six or more authors have contributed to the study of the comparative anatomy and ontogeny of the genitalia in the Lepidoptera, but their results as to the homologies of many parts, if not of every part, including the proposed terminology of these parts, contain contradictory data to such a great extent that recommendation of terms used by comparative anatomists for general usage in taxonomy would only result in profound confusion.

Acknowledgements

I am greatly obliged to M. P. VIETTE and M. H. MARION, of the Paris Museum, for information on RAMBUR'S paper, inaccessible to me in Holland, and to Dr. E. M. HERING, of the Berlin Museum, for information on certain terms.

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Rijksmuseum van Natuurlijke Historie, Leiden, NETHERLANDS

A NEW NAME FOR THE COLORADO RACE OF *PIERIS NAPI*

by CHARLES L. REMINGTON

In 1916 *Pieris napi pseudonapi* Barnes & McDunnough was described and figured (p.58; pl.VI: figs.1-3) from specimens from Silverton (10,000 ft.), Colorado, taken "in the last week of July". At the time, it was believed to be single-brooded, but Dr. MCDUNNOUGH listed *"gen. æst. pallidissima"* under *P. n. pseudonapi* in his Check-list (1938). The name *pallidissima* had been proposed in the 1916 paper (p.59) for the *P. napi* race at Provo, Utah, particularly for the "second generation (July, August)." The series of *Pieris napi* at Yale from Colorado, Utah, Nevada, and Wyoming indicates that all do, in fact, represent a single race. This race is easily distinguished from the *P. napi* populations found from California to Alaska but is superficially similar to *P. napi* from New England and parts of Europe. It is useful to maintain a subspecific name for it. However, the name *pseudonapi* had earlier been used by VERITY (1911: p.330) for the Hokkaido race of *Pieris melete* Ménétriès, and the Barnes & McDunnough name is a stillborn homonym. I hereby rename the Colorado race ***Pieris napi macdunnoughii nom. nov.*** in honor of my distinguished friend with his kind permission.

Ovipositing females have been reported (Remington, 1952) at Eldora, Colorado (9000 ft.), on 5 July and 28 July, and fresh males and females have since been taken in the same locality 17-26 August 1953. At Yale we have recently reared *P. napi* from Vermont from egg to egg in 33 days, so three annual generations at Eldora, even at 9,000 ft., would be expected. While the first generation is often somewhat darker than the second in Colorado, both broods are highly variable in this respect. My series from the Teton Mountains of Wyoming shows very dark and very pale individuals taken flying together. Even should one in principle wish to recognize distinct seasonal forms as formally named entities, the broods of *P. napi* in the Rocky Mountains do not require such names, and the name *pallidissima* should be dropped. The synonymy for the race of the Rocky Mountains and associated ranges, in the U.S.A., is as follows:

Pieris napi macdunnoughii Remington
= *pseudonapi* Barnes & McDunnough (*nec* Verity)
= *pallidissima* Barnes & McDunnough.

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Osborn Zoological Laboratory, Yale University, New Haven 11, Conn., U. S. A.

A NEW PALE MALE OF *COLIAS PHILODICE*

by CHARLES L. REMINGTON

The occurrences of "white males" in seven species of *Colias* have been recently summarized (Remington, 1954b: pp. 438-441), and two different hereditary forms in *C. philodice* Godart have been described in detail (Remington, 1954a). In corresponding for the 1953 Season Summary of North American Lepidoptera, my father, P. S. REMINGTON, learned of a new "white male" of *C. philodice* taken at Milwaukee, Wisconsin, in August, 1953, by G. F. SCHIRMER. Mr. SCHIRMER very kindly sent me the specimen on loan for comparison with the Connecticut males. It proves to be of special interest, although nothing is known of the heredity of this individual.

The Wisconsin male is distinctly whiter than the Connecticut "blonde" and "whitish" forms. Unlike all other *Colias* males and females I have seen, there is no yellow, red, orange, or pink scale on the wings, body, or appendages of the new male; this gives the upperside, and especially the underside, a chalky white appearance. The upperside scales, particularly of the forewings, have a faint creamy tinge. However, this specimen has the black scales unmodified, as in the usual wild-type *C. philodice.* The factor causing the blanching seems to have acted only on the presumed pterin-pigmented scales, since it did not affect the cuticular color of the antennae and other structures nor the black scales. The eyes also appear to have been normally pigmented. The hindwing discal spot is colorless, as in the "blonde" form, but the scales are white above and beneath, whereas the "blonde" individuals have the upperside Pale Chalcedony Yellow and the underside of the hindwing Cream-Buff. If the new male represents a genetic form, it is likely that a third gene controls it.

Dr. E. A. COCKAYNE has kindly called my attention to the apparent implication in my recent paper (1954a) that WARRIER'S (1951) "albino" form of *Colias croceus* Fourcroy had the ground-color whitish. WARRIER'S form is a hereditary one in which the usual black marginal markings have been blanched in both sexes, but the ground-color is orange except in females having the "alba" gene.

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Osborn Zoological Laboratory, Yale University, New Haven 11, Conn., U. S. A.

NOTES ON *MEGATHYMUS NEUMŒGENI*, WITH DESCRIPTION OF A NEW SPECIES (MEGATHYMIDÆ)

by DON B. STALLINGS and J. R. TURNER

During the winter of 1951 D. L. BAUER sent us a number of specimens of *Megathymus* that he had collected in central Arizona. Among them were three individuals of a species new to us. The three specimens were collected in the fall during the last part of September and the first part of October of 1951 on the eastern slope of Mingus Mountain at an elevation of 6500 feet. This location is just above the town of Jerome, Arizona, and is about 30 miles northeast of Prescott, Arizona.

The most startling character in this species was that the spots and bands on the upper surfaces were orange-red, similar to FREEMAN'S newly described *Megathymus chisosensis.* All other species of the Agave feeders that we had seen from Arizona had the spots yellow-brown to orange-brown.

At about the same time that we received these specimens we also received from WILLIAM D. FIELD of the U. S. National Museum photographs of the three specimens before EDWARDS when he described *M. neumœgeni.* It was immediately evident that BAUER'S specimens were true *M. neumœgeni.* It was also evident that the three specimens before EDWARDS consisted of two males and one female and not one male and two females as he reported.

This one male which was (and is) marked a female evidently is the thing that has caused all the confusion since *M. neumœgeni* was described—for it appears that since EDWARDS' description the name has been consistently applied to another species in which the female does have a marked resemblance to the male of *M. neumœgeni.*

As a result the literature concerning *M. neumœgeni* and its related species is full of errors. Probably the best way to bring the situation into proper focus is to make a chronological listing of the most important events as follows:

1. 1882 — EDWARDS described *M. neumœgeni* - *Papilio* 2: p. 27.
2. 1905 — DYAR described *M. aryxna* - *Journ. N.Y. Ent. Soc.* 13: p. 141.
3. 1911 — SKINNER described *M. drucei* - *Trans. Amer. Ent. Soc.* 28: p. 207.
4. 1912 — BARNES and MCDUNNOUGH published DYAR'S restriction to the application of the name *aryxna* - *Contrib. Nat. Hist. Lepid. N. Amer.* 1, No. 3: p. 23.
5. 1924 — SKINNER and WILLIAMS designated the type of *M. aryxna* - *Trans. Amer. Ent. Soc.* 50: p. 205.
6. 1950 — FREEMAN described *M. evansi* - *Field & Lab.* 18: p. 144.

EDWARDS, in his description of *M. neumœgeni,* refers to a fourth "female" caught, but it is evident that this specimen was not before him when he made his description, and it is our opinion that this fourth specimen should not be considered a part of the type series. We understand that this fourth specimen is in the Strecker Collection at Chicago. EDWARDS' three specimens were caught near Prescott, Arizona.

DYAR described *M. aryxna* from ten specimens before him and referred to Figs. 3 & 4, Plate 69, *Biologia Cent. - Am. Lep. Het.,* Vol. III. The two figures (3 & 4) are hand drawings of actual specimens still in the British Museum. DYAR had before him six specimens of one species and four specimens of another species. As a matter of convenience we shall refer to the species represented by the six specimens before him as Species No. 1 and the other four as Species No. 2. All ten specimens were males, as are the two in the British Museum. The genitalia of all twelve specimens have been examined, and none are *M. neumœgeni.*

In 1911 SKINNER took the position that Fig. 3 in the *Biologia* was a different species than Fig. 4 and gave it the name of *M. drucei.* Brig. W. H. EVANS of the British Museum has examined the genitalia of both specimens (Figs. 3 & 4) and states that they are both "*M. neumœgeni*" - meaning Species No. 1, for this is a fairly common species and has been called *M. neumœgeni* by nearly everyone - and is to this day. Practically all publications and plates prior to the present date refer to Species No. 1 as *M. neumœgeni.*

Sometime after DYAR described his *M. aryxna,* BARNES and MCDUNNOUGH suggested to him that Species No. 1 was *M. neumœgeni* and that he should restrict his name to Species No. 2. This he did in 1910 to the extent of making a label as follows and attaching it to one specimen of Species No. 2:-

Megathymus
aryxna
Cotype Dyar
(Sensu Restr) (1910)

He never published this restriction. In 1912 BARNES and MCDUNNOUGH did.

We are satisfied that Fig. 4 in the *Biologia* is the same thing as Species No. 1. The spots in the specimen shown in Fig. 3 are somewhat reduced; while this is not an unusual situation for individuals of Species No. 1, the fact is that there is a species in Mexico that is distinct from Species No. 1 but does resemble Fig. 3. At this time we do not know that Fig. 3 represents this Mexican species, but point out that there is a species that has a resemblance to Fig. 3.

In 1924 SKINNER and WILLIAMS challenged the restriction and designated Fig. 4 of the *Biologia* as the type of *M. aryxna.* They, along with most subsequent authorities, took the position that DYAR described Species No. 1. Frankly, we are unable to determine which of the two species he was describing. His description merely separates his *M. aryxna* from *M. neumœgeni* by saying that "It differs from *neumœgeni* in having the fulvous

markings considerably reduced, the outer band being broken into spots." This is true of both species before him. The first sentence in his description does refer to Fig. 3 & 4 in the *Biologia.* This sentence is probably what has caused so many to assume that he was describing Species No. 1. Actually, if we stop to think about it, we realize that he was describing the entire lot as one species and probably was treating the 4 specimens of Species No. 2 as females; nearly all authorities at that time were confusing the sex in *Megathymus.*

In 1950 FREEMAN, following the general view that the name *M. aryxna* had to be applied to Species No. 1, described Species No. 2 as *M. evansi.*

We have found three distinct schools of thought as to what comprised the type series of *M. aryxna.* Some said they were the two specimens in the *Biologia* others said they were the ten specimens before DYAR, and still others said they were all twelve specimens.

We find that there is a great difference of opinion as to the validity of DYAR'S restriction. In view of the action of the International Commission last August at the Copenhagen Congress with reference to the Principle of the First Reviser it would appear that the synonymy should be as follows:

A. *Megathymus neumœgeni* Edwards

B. *Megathymus aryxna* Dyar
    syn. *evansi* Freeman

C. *Megathymus drucei* Skinner
    syn. *neumœgeni* auctt.

This arrangement is based on the assumption that both Figs. 3 & 4 of the *Biologia* are Species No. 1. If the name *M. drucei* is found to apply to a species other than Species No. 1, then Species No. 1 will have to be described as a new species. We come to the foregoing conclusion rather reluctantly as it would seem more practical to apply the name *M. aryxna* to Species No. 1 and the name *M. evansi* to Species No. 2, leaving the name *M. drucei* to apply to the Mexican species should it be found to so apply.

We designate the male specimen in EDWARDS' type series (now in the National Museum at Washington, D.C.), which is labeled a female, as the LECTOTYPE of *Megathymus neumœgeni.* The female in the type series is a normal specimen and not aberrant as some would believe. The type locality is Prescott, Arizona. The life history follows the usual pattern of the Agave feeders. The food plant is *Agave couesii* Engelmann.

The label on the specimen pictured at Fig. 4 in the *Biologia* indicates that it was caught in Mexico. The type of *M. drucei* was caught by MORRISON and is labeled N. Sonora, Mexico.

Among the specimens that BAUER sent us were a series of what we first considered to be a subspecies of *M. drucei.* It was not until August of 1953, after considerable study and many dissections, that we came to the conclusion that in fact this was a separate species. Its description follows.

Megathymus baueri new species

MALE. Upper surface of primaries: Deep black, with the base of wing orange-fulvous, extending outward along inner margin of the wing to a point just to the edge of the lowest spot in the discal band. There is an elongated spot-like suffusion of orange-fulvous scales extending from near the base to almost half way to the discal band. Spot 1 (Cell spot) is orange-fulvous, more linear that round and rather small. Spots 2, 3, and 4 (subapical spots) are of the same color and slightly linear. Spots 5 & 6 (submarginal spots) out of line from the subapical and discal spots and small. These two spots are the same color as those above. The discal band is composed of spots 7, 8, and 9. These three spots are rather small and separated from each other by more than the width of the veins. These three spots form a straight line, the top one of which is toothed inward, the middle one round and the bottom one broader at its bottom than at the top. All three spots are deep orange-fulvous. Fringes alternately checkered black and light orange.

Upper surface of secondaries: Deep black, basal half covered with orange hairs. Spots 10, 11, 12, and 13 (basic spots of the discal band) are in a straight line. There is one spot above spot 10, and outside of spot 13 there is an elongated spot which curves downward toward the anal angle. All spots are deep orange-fulvous. Fringes alternately checkered black and light orange.

Under surface of primaries: Dull black over all but the area from the discal spots to the apex, which is sparsely overscaled with gray. All spots reappear and are lighter in color. The cell, subapical, and submarginal spots are reduced in size.

Under surface of secondaries: Black, heavily overscaled with orange-gray. The discal band above appears on this surface only as a somewhat lighter gray area. There are one to two small white spots below the costal area.

Abdomen: Orange-fulvous at the cephalic end shading off into gray posteriorly above, beneath light grey. Thorax: Dark orange-fulvous above, gray beneath. Palpi: Gray. Antennæ: The base of the club gray; the remaining portion of the antennæ is black above, lighter beneath, showing faint rings.

Expanse of forewing from 26 to 28 mm.; average 27.5 mm. Wing measurements of the HOLOTYPE: Forewing, apex to base 27.5 mm., apex to outer angle 15 mm., outer angle to base 20 mm.; hindwing, base to end of vein Cu_1, 19 mm.

FEMALE. Upper surface of primaries: Deep black with the same general overscaling as in the males except that it is a little lighter in coloration and somewhat more extensive. All spots are present and only slightly lighter in coloration. Spot 7 (top spot of discal band) is elongated inwardly and terminates just below and slightly beyond the outer edge of the cell spot. Spot 9 (bottom one) is more narrow and toothed on the inner side in about the center. On the outer edge of these three spots a near straight line is formed, curving slightly outward at the top and bottom. Fringes alternately checkered black and light orange.

Upper surface of secondaries: Deep black, heavily overscaled with fulvous hairs especially over the basal half of the wing. The spots appear in the same manner as in the males except they are about twice as large. Fringes alternately checkered black and light orange.

Under surfaces of primaries: Same as in the males except the spots are wider.

Under surfaces of secondaries: Dark grayish-black, heavily overscaled with orange gray. There are three white spots present, two small circular ones below the costal area and another circular one near the upper part of the discal area. The discal band of spots above shows through as a well defined grayish area and in some instances can be recognized as spots.

Abdomen: Fulvous at the cephalic end above, becoming grayish-black posteriorly, while on the lower side it is dark grayish-black. Thorax: Fulvous above, grayish beneath. Palpi: Gray. Antennæ: Same as in the males.

Expanse of forewing varies from 28 to 30 mm.; average 29 mm. Wing measurements of the ALLOTYPE: forewing, apex to base 29 mm., apex to outer angle 17 mm., outer angle to base, 20 mm.; hindwing, base to end of vein Cu_1 21 mm.

Described from 78 specimens (55 males and 23 females) collected near Verde Hot Springs, Yavapai County, Arizona, and other localities in Yavapai County during October 1950, 1952, and 1953 by DAVID BAUER, DON B. & VIOLA N. STALLINGS, and Dr. & Mrs. R. C. TURNER.

HOLOTYPE, Male, Oct. 25, 1952, Verde Hot Springs, Arizona, elevation 4,000 ft. (STALLINGS); ALLOTYPE, female, Oct. 4, 1953, Verde Hot Springs, Arizona, elevation 4,000 ft. (TURNER), are in the collection of the authors. There are 19 male and 6 female paratypes in the collection of BAUER. One male and one female paratype is being deposited in each of the following collections, with others to be determined later: U. S. National Museum, American Museum of Natural History, and H. A. FREEMAN.

We take pleasure in naming this new species for Mr. D. L. BAUER who has done some very fine collecting and life-history work in Arizona.

Superficially *M. baueri* is closer to *M. drucei* than to any of the other described species of *Megathymus*. However there are several ways by which the two can be readily separated: 1) the fringes of *M. baueri* are light orange and black instead of white and black like *M. drucei;* 2) the ground color is of a darker shade of black and the spots are smaller than in *M. drucei;* 3) the discal spots are located a little farther basad than the same spots in *M. drucei;* 4) the discal band on the upper surface of the secondaries forms a straighter line in *M. baueri* than it does in *M. drucei;* 5) the white spots on the lower surface of the secondaries are much smaller in *M. baueri;* 6) the overscaling on the under surfaces is orange-gray rather than white-gray.

The food plant is *Agave parryi* Engelm., the dominant species of the area at low (4,000 ft.) elevations.

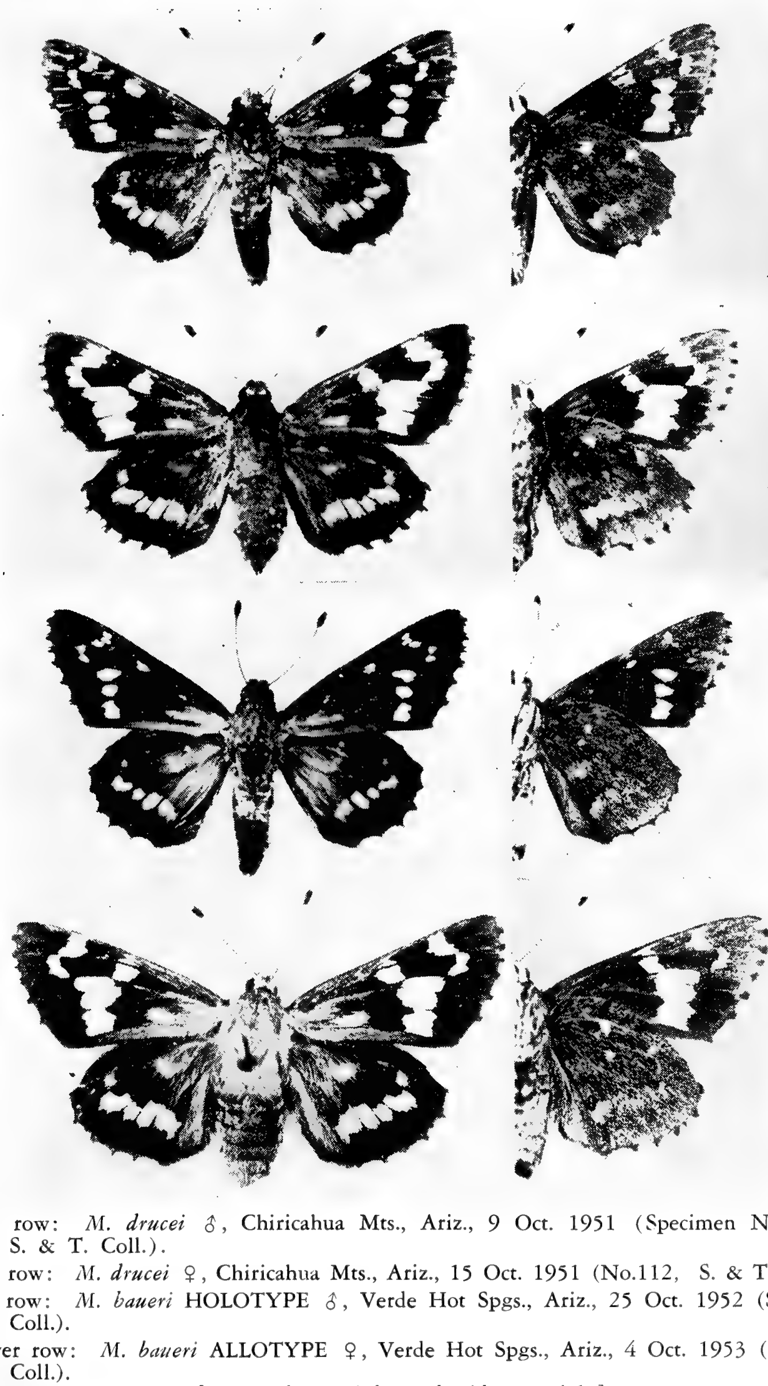
The life history follows the general pattern of the Agave feeders. The larvæ burrow only a short distance in one leaf. In view of this fact we suspect that this species and others of the Agave feeders feed on the fluid of the plant. The pulp removed by the burrowing larva is not in our opinion sufficient to support an insect of this size. In nearly all of the Agave feeders the opening to the burrow is placed low on the leaf, sometimes on the upper side, sometimes on the lower side, just at or above the area where the next leaf comes in contact with the leaf that has the burrow. Thus most openings are in the green area of the leaf. *M. baueri* differs from the others in this respect in that the opening is even lower, being adjacent to the white area of the leaf on the under side. The white area is caused by the next leaf fitting around the leaf above it so that the base does not receive sunlight and therefore remains white. When the adult emerges it must have a tight squeeze to get out of its hole and up between the close fitting leaves, for we never were able to pry the leaves apart sufficiently to locate the hole; we literally had to tear the plant apart to locate the pupæ. The opening in the leaf to the burrow is covered by a "trap-door". *M. baueri* always places the opening on the under side of the leaf.

The male genitalia are more similar to those of *M. neumœgeni* than to those of *M. drucei* or *M. aryxna.* In *M. baueri* and *M. neumœgeni* the lower clasp of the prong on the uncus is evenly curved. In *M. drucei* it curves abruptly, and in *M. aryxna* it is straight. The clasper is nearly as broad as in *M. aryxna,* and the chitinous fold, posteriorly situated from the prong, is fairly thick, while in *M. drucei* it is not as thick. The ædeagus is somewhat different.

The female genitalia show the specific difference perhaps better than in the male, for the general shape of the vaginal plate varies with the species. In *M. neumœgeni* and *M. aryxna* the upper flanges are not as sharply pointed as in *M. baueri* and *M. drucei,* and the chitinous fold that extends from the outer edge posteriorly bulges heavily near the bottom, while in *M. drucei* the bulge is not present and the fold tapers nearly to a point at the posterior end. *M. baueri* has the upper shape of *M. drucei* and the lower shape of *M. neumœgeni* and *M. aryxna.* The photographs here presented, of the adults of the various species involved, along with the photographs of the genitalia, should aid in the separation of *M. neumœgeni, M. aryxna, M. drucei,* and *M. baueri.* It should be pointed out that there is considerable variation in the male genitalia, and the photographs that we present represent average specimens. The photographs of *M. drucei* represent our present concept of this species.

We are deeply indebted to WM. D. FIELD of the U. S. National Museum for his assistance and information furnished from the material available in the Museum, to H. A. FREEMAN for his assistance in the dissections and study of the specific characters of the species involved, to Brig. W. H. EVANS of the British Museum for photographs of types and drawings of genitalia of the types, and to Dr. A. B. KLOTS for photographs of types made on his recent visit to Europe.

Caldwell, Kansas, U. S. A.



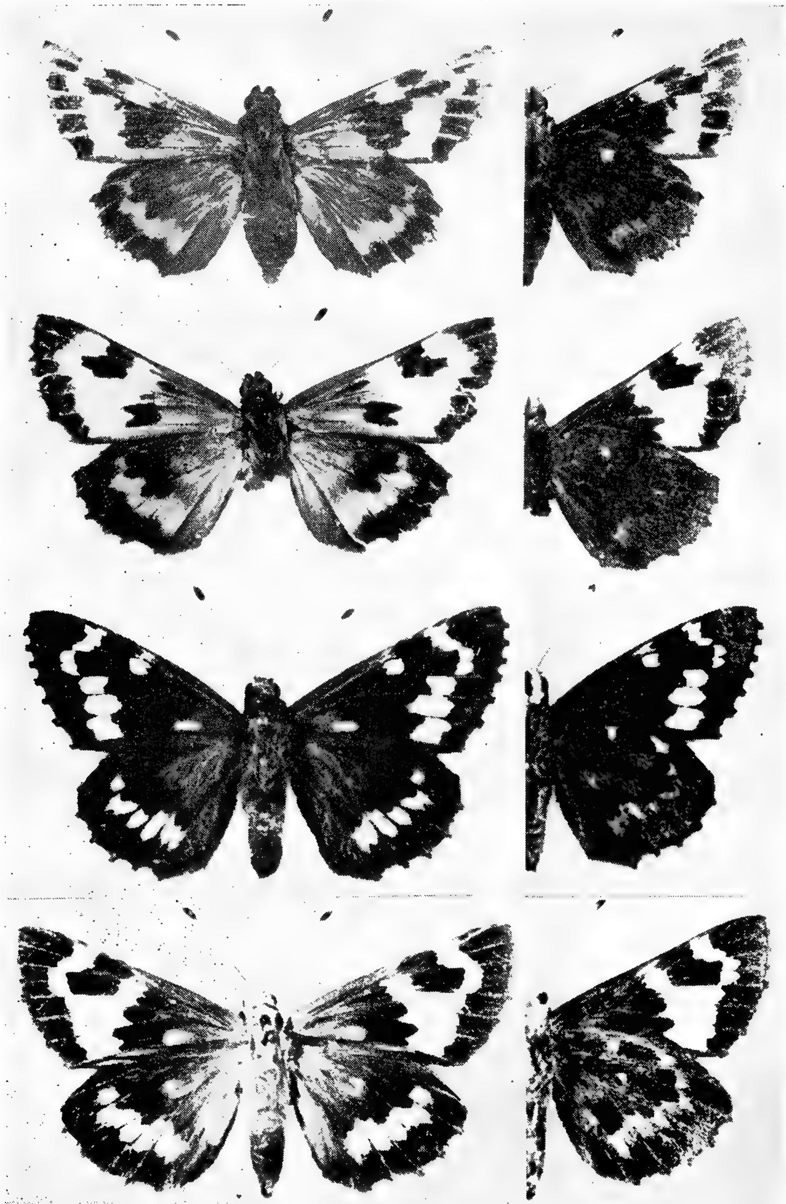
Top row: *M. drucei* ♂, Chiricahua Mts., Ariz., 9 Oct. 1951 (Specimen No. 111, S. & T. Coll.).

2nd row: *M. drucei* ♀, Chiricahua Mts., Ariz., 15 Oct. 1951 (No.112, S. & T. Coll.).

3rd row: *M. baueri* HOLOTYPE ♂, Verde Hot Spgs., Ariz., 25 Oct. 1952 (S. & T. Coll.).

Lower row: *M. baueri* ALLOTYPE ♀, Verde Hot Spgs., Ariz., 4 Oct. 1953 (S. & T. Coll.).

[Uppersides at left; undersides at right]



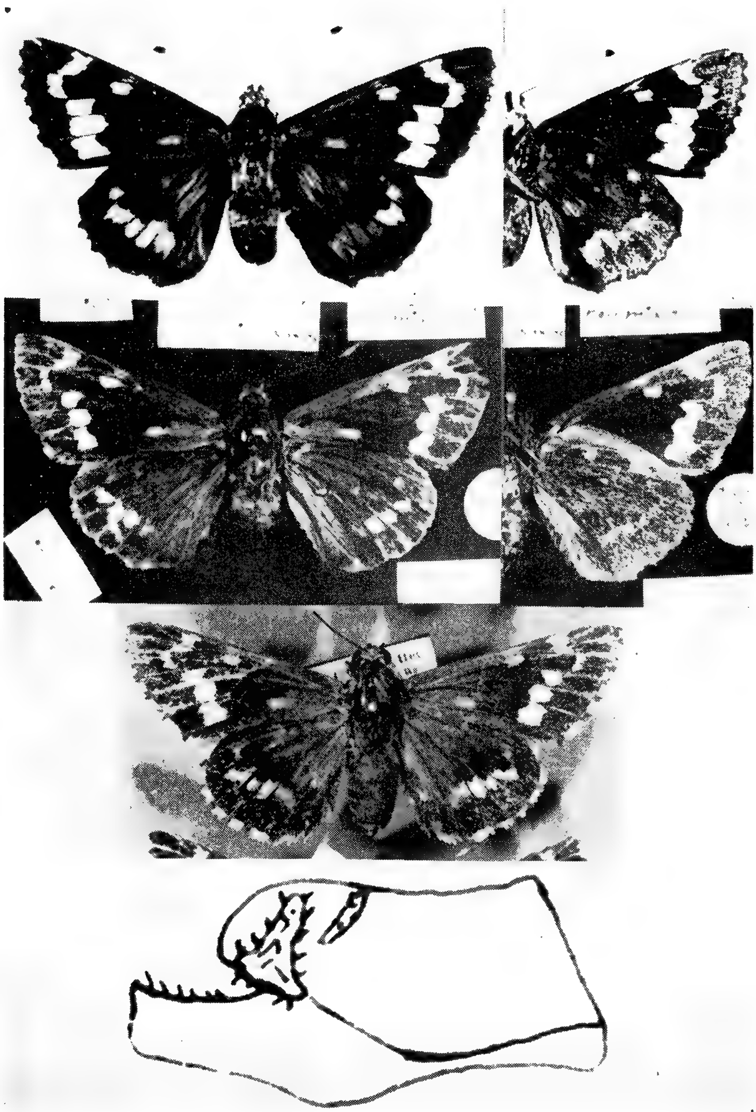
Top row: *M. neumœgeni* LECTOTYPE ♂, Prescott, Ariz. (U.S.N.M.).

2nd row: *M. neumœgeni,* the only ♀ in EDWARDS' type series, Prescott, Ariz. (U.S.N.M.).

3rd row: *M. evansi* HOLOTYPE.

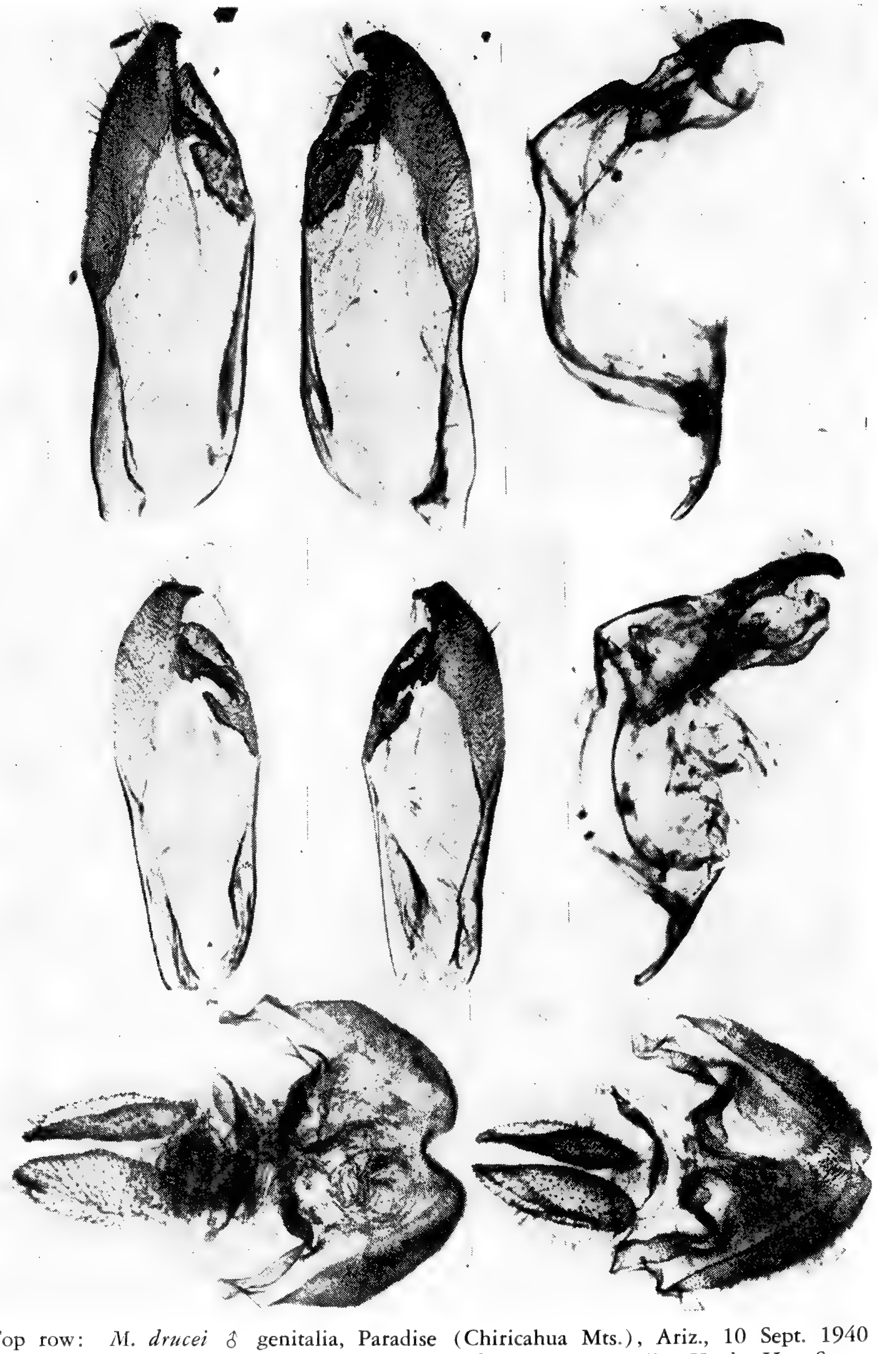
Lower row: *M. evansi* ALLOTYPE.

[Uppersides at left; undersides at right]



Top row: *M. aryxna* TYPE ♂, as restricted by DYAR.
2nd row: *M. drucei* TYPE ♂.
3rd row: Photograph of specimen in Brit. Mus. pictured in *Biologia,* Pl.69: fig.4.
Lower row: Drawing by Brig. EVANS of ♂ clasper of TYPE of *M. drucei.*

[Top rows with uppersides at left, undersides at right]



Top row: *M. drucei* ♂ genitalia, Paradise (Chiricahua Mts.), Ariz., 10 Sept. 1940 (No.91, S. & T. Coll.). 2nd row: *M. baueri* ♂ genitalia, Verde Hot Spgs., Ariz., 19 Oct. 1952 (No.105, S. & T. Coll.). Lower row, left: *M. baueri* ♀ genitalia, same locality, 10 Oct. 1950 (No.99, S. & T. Coll.). right: *M. drucei* ♀ genitalia, Chiricahua Mts., Ariz., 12 Oct. 1951 (No.93, S. & T. Coll.).

Top row: *M. neumœgeni* ♂ genitalia, Jerome, Ariz., 25 Sept. 1949 (No.87, S. & T. Coll.). 2nd row: *M. aryxna* ♂ genitalia, Ramsey Canyon, Ariz., 12 Sept. 1950 (No.94, S. & T. Coll.). Lower row, left: *M. aryxna* ♀ genitalia, same locality, 1 Sept. 1950 (No. 96, S. & T. Coll.). right: *M. neumœgeni* ♀ genitalia, Jerome, Ariz., 2 Oct. 1952 (No.89, S. & T. Coll.).

EFFECTS OF HUMIDITY DURING GROWTH OF *PIERIS RAPÆ* LARVÆ

by P. H. H. Gray

The experiment reported here was similar to one described in a previous article (Gray, 1951). A batch of eggs was obtained from one female *Pieris rapæ* L., which had laid them on leaves of *Hesperis matronalis* L. in a closed pint-sized ice-cream carton with *Myosotis* flowers as food. On June 2, 1953, 70 eggs were counted. On June 7 there were 67 new larvæ.

On June 11 young larvæ were placed in groups of 8 on fresh food plant inside quart-sized preserving jars, known as sealers, in each of which there was a smaller jar (6 oz.) containing a KOH solution, or water, or soil. The KOH solutions were of such specific gravity as to develop relative humidities of 20%, 40%, or 80% (Buxton & Mellanby, 1934). The water and the soil each provided a saturated atmosphere. One group of larvæ was placed in a sealer the lid of which was kept loose, to provide a relative humidity of about 70%, that of the air in the basement in which all of the sealers were kept. Two other groups of larvæ were placed in a closed but well-lighted and ærated under-porch, where the free circulation of air was expected to yield drier and more natural conditions than the basement; of these two groups, one was reared in a closed ice-cream carton, and the other was surrounded with wire gauze, having a lid of colorless cellophane.

The small jars containing the fluids and the soil were capped with lids of cellulose sponge. The food-leaves were cut each with a short length of stem which served to hook the leaf, point downwards, onto the sponge, out of contact with the frass which fell onto the floor of the sealer. The stems of the food-leaves in the carton passed through a hole into the water below, as did those of the leaves in the wire cage.

The larvæ fed until about June 19, when some began to prepare silk mats. They all pupated June 20-23. About half of the larvæ in the sealers pupated horizontally on the lids; one of the ten in the carton did so.

The pupæ remained in their original containers until June 26 and 27, when they were, if possible, cut free from their silk attachments and placed each in a small vial; the vials were placed in numbered large glass tubes, 8″ x 1″, stoppered with cotton, to await emergence of the butterflies. A few larvæ pupated below the shoulder of the sealer and could not be removed safely; the butterflies emerged from these pupæ inside the sealers.

59 butterflies emerged June 28-July 3; 4 were crippled. Of the 55 whose characters have been used in these analyses, 24 were males and 31 were females. The following characters were measured:

1. Pupal length and breadth, to the nearest 0.5 mm.; the product of these two measurements was divided by 6, to give a "pupal index".
2. Weight of the dry pupal skin to the nearest 0.1 mgm.; the skins were weighed on a Mettler Gram-atic balance.
3. Weight of the butterfly shortly after emergence.
4. Weight of the butterfly after drying at room temperature, 76° F.
5. Radius of the right fore wing to the nearest mm.

The butterflies were weighed first on the author's "wire balance", and, after a week in a calcium chloride desiccator, on the Mettler balance. It was found, however, that after removal from the desiccator, the butterflies gained weight rapidly by the invasion of hygroscopic moisture which rendered these latter weighings unreliable. Comparison of weighings on the two balances, at room temperature, gave close agreement between the values; thus, the average weight of eleven butterflies on the wire balance was 23.1 mgm. and on the Mettler 23.0 mgm. The ranges and mean values were:

No.	Character	Range	Mean
49	Pupal index	10.7—15.8	13.16±.225
49	Pupal skin, mgm.	1.0— 2.0	1.52±.039
54	Imago, fresh, mgm.	40.0—90.0	61.44±.421
55	Imago, dry, mgm.	14.4—29.7	21.63±.454
55	Wing radius, mm.	20.0—26.0	23.50±.194

The values within each character were normally distributed about the mean, over two-thirds of them falling in the modal 50% range. The distribution of paired values in scatter diagrams and statistical analysis for the correlation coefficient between any two of the characters showed that the probability for dependent association was high in all cases.

The purpose of this article is to show that the two different "climates", dry and moist, had some influence on the characters measured. The dry climates are considered to be those provided by the conditions outside, *i.e.*, in the wire cage and the carton, by the 20% and 40% relative humidities, and by the basement air, which had a relative humidity of about 70%. Evidence of one of the effects of the various conditions was found in the state of the frass: that from the 20% and 40% r.h. was smaller, lighter green and drier than the normal that from the 80%, the water, and the soil was black and very wet and packed into a paste; that in the basement air and outside was of normal size, color, and consistency.

After grouping the measurements within each character above or below the mean value for that character, in respect of the different conditions of relative humidity, it was found that most of the specimens having values above the mean were from the dry conditions, and most of those with values below the mean were from the moist conditions. The values were submitted to statistical analysis to ascertain if the differences between the means of those from the two "climates" were significantly different from each other. Application of the t test for unequal numbers of unpaired varieties (Goulden, 1952) showed that the differences were significant for each character. The results of these analyses are as follows:

Character	Mean, dry	Mean, moist	t value	P value
Pupal index	13.48	12.47	2.127	.05—.02
Pupal weight	1.685	1.313	4.666	<.001
Weight fresh	64.91	55.26	10.945	<.001
Weight dry	22.64	19.71	2.760	<.01
Wing radius	24.11	22.53	3.874	<.001

With the exception of that for pupal index, the *t* values indicate the probability that these differences would occur by chance once in over one hundred trials (Fisher & Yates, 1938).

The numbers of specimens of emerged butterflies and their mean dry weights (in milligrams) under the different conditions were as follows:

No.	Condition	Mean wt.
6	Porch	22.20
10	Carton	24.12
7	20%	21.70
7	40% r.h.	22.68
6	Basement r.h.	21.77
	Mean of 36..................	22.64
8	80% r.h.	20.82
7	Water	17.87
4	Soil	19.70
	Mean of 19..................	19.71

One of the specimens from the cage under the porch weighed only 14.4 mgm.; if that be omitted from the set, as aberrant, the mean weight of the other five becomes 23.76 mgm.

The temperature of the under-porch was often some degrees higher than that of the basement, reaching 82° F. during the day; the average of the 15 normal specimens in the cage and the carton was 24.00 mgm, and of the 20 in the 20%, the 40%, and the basement relative humidities was 22.03 mgm.; the difference was not significant.

The average dry weights of the butterflies, in sexes, were as follows; figures are milligrams and, in parentheses, the number of specimens:

	Males	Females
Dry condition	24.3 (17)	21.3 (19)
Moist conditions	20.4 (7)	19.3 (12)

The males were thus, on the average, about 13% heavier than the females. The distribution of fresh and dry weights corresponded almost exactly.

Summary

The effects of dry and moist atmospheres on the development of *Pieris rapæ* reared on *Hesperis matronalis,* have been compared. The drier conditions yielded larger pupæ with heavier skins, and heavier adults with larger wing-spread. The characters measured were correlated one with another.

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Box 236, Macdonald College Quebec, CANADA

OBSERVATIONS ON *RECURVARIA MILLERI*, THE LODGEPOLE NEEDLEMINER (GELECHIIDÆ)

by G. Allan Samuelson

The Lodgepole Pine Needleminer, *Recurvaria milleri* Busck, has again developed a major outbreak in Yosemite National Park in the Sierra Nevada of California. Outbreaks of this small Gelechiid have occured every decade or so in Yosemite during recent times and this present epidemic seems to rank along with the largest infestations thus far known, including the major epidemic in 1919.

This infestation is centered in the Tuolumne and Conness basins in the eastern part of Yosemite National Park. The region, for the most part, lies in the Canadian and Hudsonian Life-zones, with elevations ranging from 7,000 to 9,500 feet. The general elevations of the most concentrated infestations occur between 8,000 and 9,000 feet. However, the attacks continue to higher elevations, becoming less evident with the increase of altitude up to nearly 10,000 feet, just below the timberline in this area. Minor attacks have been noted down to 7,000 feet.

The areas of Tuolumne Meadows and Conness Creek within the above mentioned basins and the Tenaya Lake area on the western border of the Tuolumne basin are the most severely attacked. Smaller infestations of less importance are scattered throughout these basins in a region approximating 125 square miles. The Lodgepole Pine, *Pinus contorta murrayana,* the host for *R. milleri,* is the dominant species throughout the entire region. In the Tenaya Lake area, Mountain Hemlock has replaced many of the once dominant Lodgepole Pine due to the 1919 epidemic. Nevertheless, the remaining Lodgepoles in this area have been heavily attacked. In the Conness Creek and the Tuolumne Meadows areas, the forests are practically pure Lodgepole. These areas were attacked extremely hard, especially in the Conness Creek area, which involved almost 100% attack. The areas under serious epidemic conditions (85% infestation) of the entire region, entail well over 45,000 acres.

R. milleri shows no preference to the age of the host tree. In moderately infested areas, where there is a wide selection of the host tree, *R. milleri* is just as likely to attack a young tree as mature or overmature trees. The attacked trees seem to be equally infested from top to bottom.

The reason these infestations are serious is that the host tree is left in a weakened condition and becomes highly vulnerable to fatal barkbeetle attack (Scolytidæ). *R. milleri* alone had never been known to kill its host tree, until we found four succumbed Lodgepoles in the Conness Creek area, deaths caused entirely by this needleminer. Another interesting factor in the Conness Creek area was that the barkbeetles had already started their usual post-needleminer outbreak in August. Ordinarily, these barkbeetles attack the season following the needleminer adult emergence. By the end of August 1953, 70% of the entire Lodgepole population in the immediate Conness Creek area was dead.

The life cycle of *R. milleri* takes two years to complete, and the adults fly only in alternate years. In Yosemite and other regions in California, the adults fly in odd-numbered years while further north this species flies in even-numbered years. Adult emergence extends from the first of July to the last of August. The peak of emergence is usually in the last part of July. The eggs are deposited on and under the needle sheaths at the base of the needles and within the abandoned mines, with the average number of five or six eggs. The incubation period lasts, on the average, for two weeks. The larvæ during the course of their 24 month life cycle actually mine three separate needles before pupation occurs. I will go into a little detail on the larval life cycle, as several interesting observations were noted there. The young larvæ attack the tender, current year's needle growth upon hatching, with one individual per needle. By the end of October of the first season, the larvæ have the needle partially mined, and then they go into a state of torpor during the winter. Mining is resumed in May of the following spring, and the larvæ have the first needle completely mined by August. The larvæ now make their first migration to a fresh needle of the current year's growth and have that needle, again, partially mined before they cease feeding for the second winter period. The larvæ resume activity the following May, and they completely finish the second needle by the first of June. The larvæ now migrate in search of a needle of the same year's growth. The third and last needle is rapidly mined, and the larvæ are fully mature by the end of June. Pupation occurs within the third needle, and adult emergence follows about four weeks later.

In 1953, however, owing to the late season in this area, the development of *R. milleri* was retarded about three weeks. The second larval migration did not begin until the second week in July. At this stage, we noted several interesting observations. In the heavily infested areas the supply of green needles was quickly diminishing. Even the oldest needle growths were soon taken over by the migrating larvæ. During the third week in July there were no fresh needles left in the heavily infested areas, and yet many larvæ were still migrating, with, no doubt, a huge percentage of larval mortality reached in these areas. In one area, however, the migrating larvæ attacked a White Pine. It is not unusual for this needleminer to infest other species such as White Pine; nevertheless, *R. milleri* seemed to be quite devoted to its principal host, as other White Pine stands in heavily infested areas were left untouched. After this migration, I found about six needles which contained two larvæ instead of the usual single larva in each needle. All the larvæ appeared to be quite healthy. This is, apparently, very unusual, as these six needles were the only examples noted after close examination of over four thousand needles. This last observation is somewhat a puzzle: why would a very minute percentage of the nearly mature larvæ choose to share a needle and at least appear healthy, while millions of other larvæ chose to starve to death rather than share quarters? The first adults did not appear until the last week in July, and the flight did not reach its peak until after the second week in August.

Immature stages were collected from every major infestation for studying and rearing. We later found that a fair number of Chalcid wasps emerged from the rearing material. The percentage of Chalcids in this case, however, did not affect the total adult emergence to controllable standards. Perhaps under ordinary conditions these wasps, ecologically, keep a substantial check on *R. milleri.*

Reference

Patterson, J. E., 1921. Life History of *Recurvaria milleri,* the Lodgepole Pine Needle-Miner, in the Yosemite National Park, California. *Journ. Agric. Res.* 21: 129-133.

3824 Walnut Ave., Concord, Calif., U. S. A.

THE IDENTITY OF *CRAMBIDIA ALLEGHENIENSIS* (LITHOSIIDÆ)

by HARRY K. CLENCH

Half a century ago HOLLAND (*Moth Book*: 104, pl. 13, fig. 31; 1903) described *Crambidia allegheniensis* from a single male taken by him (*cf. loc. cit.)* in East Pittsburgh, Pennsylvania. The single type, a male, has remained unique in the Carnegie Museum collection, and the species has been listed with a query in lists ever since. A reexamination of this specimen is clearly overdue.

The type is in very good condition save for the complete absence of antennæ (replaced by two clumsily glued, non-lepidopterous, bristles: possibly to make the specimen more photogenic for its portrait in the *Moth Book).* It bears two labels: (1) Moth Book/Plate XIII/Fig.31 [letterpress, with numbers penned in]; and (2) C. allegheniensis/Type.Holland/Ally Co., Penna. [penned in HOLLAND'S hand, possibly many years after publication of the name]. In addition the specimen has been assigned C. M. Ent. type series no. 232, and a label to that effect also affixed.

A brief description of pertinent structures is as follows: palpi short, not reaching front (indeed, not reaching the base of the proboscis); proboscis fully developed; antennæ (broken off); legs smoothly scaled, hind tibia with two pairs of spurs; forewing: R_1 from cell, anastomosing almost immediately with Sc and remaining with it; areole present, R_2 from its anterior border; R_3-R_4-R_5 stalked from its apex, R_5 branching off almost immediately; M_1 from areole just beyond cell; M_2 absent; M_3 and Cu_1 well stalked from lower angle of cell; Cu_2 from middle of cell; hindwing: Sc + R_1 from middle or

just before middle of cell; Rs and M_1 well stalked from upper angle of cell; M_2 absent; M_3 and Cu_1 well stalked from lower angle of cell; Cu_2 from middle or just before middle of cell (opposite the origin of $Sc + R_1$).

A few inaccuracies in HOLLAND'S description want correction: Frons, vertex and patagia (*i.e.,* collar) are orange, not "pale yellow"; palpi yellow orange; thorax and tegulæ brownish tan, the former tinged with orange posteriorly; abdomen dorsally very pale yellowish with a touch of gray in middle; below pale gray, becoming yellowish posteriorly; terminal tuft yellow tinged with orange above; the legs are orange yellow, fore and middle legs with faint tinge of tan dorsally on tibia and tarsal segments; forewing below with a terminal yellow band on outer margin; costa with a long posteriorly-directed fringe of short scales below; hindwing very pale yellow, the costa narrowly grayish (especially below); remainder of description as in HOLLAND.

The foregoing agrees perfectly with the European species, *Eilema complana* Linn. (*cf.* Hampson, *Cat. Lep. Phal. Br. Mus.* 2: 164; 1900; and Seitz, *in* Seitz, *Grossschmett. Erde* 2: 68. pl. 12 i,k (*Lithosia c.*); 1910), and accordingly HOLLAND'S *Crambidia allegheniensis* must be synonymized to this species.

Since HOLLAND captured the specimen himself, there is small possibility of mislabeling being the reason for its occurrence here. I rather suspect that a pupa was imported with some horticultural material, from which the moth emerged to fly into HOLLAND'S net and our lists.

Section of Insects & Spiders, Carnegie Museum,
Pittsburgh 13, Penna., U. S. A.

NYMPHALIS CALIFORNICA: A NEW RECORD FOR PENNSYLVANIA

Mr. and Mrs. C. G. MERKER, of Warrendale (Allegheny Co.), Pennsylvania, recently showed me a pair of *Nymphalis californica* Boisduval which they had taken near their home on sugar at about dusk, on 2 September 1945. One of these they have most generously given to the Carnegie Museum. A third specimen also was taken, but was released in the hope that it was a female who would show her gratitude by laying some eggs. The species, however, has never turned up since, despite active searching.

It is interesting, and possibly significant, that VOSS' (*Lepid. News* 4: 46; 1950) unusual record of this species (one, on damp sand along the Straits of Mackinac, Emmet Co., Michigan) was taken the same year, in the same month, and almost on the same day: 6 September 1945!

HARRY K. CLENCH, Carnegie Museum, Pittsburgh 13, Penna., U. S. A.

SYNOPSIS OF THE KNOWN LIFE-HISTORIES OF JAPANESE BUTTERFLIES

by TARÔ IWASE

For the convenience of lepidopterists everywhere interested in foodplant questions, as well as for those in Palearctic Asia, the following checklist has been prepared. It includes the results of the very active post-war study of life-histories in Japan. All are drawn from published records, mostly in Japanese, and all seem to be reliably established. The foodplants and modes of hibernation in this list are only those discovered in Japan, and unstudied subspecies are omitted.

Abbreviations:

S. Single brooded.	E. Egg hibernation
D. Double (or more) brooded.	L. Larval hibernation.
(M). Myrmecophilous.	P. Pupal hibernation.
(F). Feeds on flowers or fruits.	A. Adult hibernation.

"Larva on" means "wild larva actually feeds on."

HESPERIIDÆ

1. *Pyrgus maculatus* Bremer & Grey larva on *Potentilla* (Rosaceæ). D. P.
2. *Erynnis montanus* Bremer larva on *Quercus* (Fagaceæ). S. L.
3. *Daimio tethys tethys* Ménétriès and *D. t. daiseni* Riley larva on *Dioscorea* (Dioscoreaceæ). D. L.
4. *Choaspes benjaminii japonica* Murray larva on *Meliosma* (Sabiaceæ). D. P./L.
5. *Bibasis aquilina chrysæglia* Butler larva on *Kalopanax* (Araliaceæ). S. E.
6. *Notocrypta curvifascia* Felder & Felder larva on *Alpinia* (Zingiberaceæ). D. P.
7. *Leptalina unicolor* Bremer & Grey larva on *Miscanthus, Imperata, Setaria* (Gramineæ). D. L.
8. *Carterocephalus palæmon satakei* Matsumura larva on Gramineæ. S. L.
9. *Carterocephalus sylvicola isshikii* Matsumura ?larva on Gramineæ. S. L.?
10. *Æromachus inachus* Ménétriès larva on Gramineæ. D. L.?
11. *Isoteinon lamprospilus* Felder & Felder larva on *Miscanthus* (Gramineæ). S. L.
12. *Thymelicus leoninus* Butler larva on *Agropyron* (Gramineæ). S. E.?
13. *Thymelicus sylvaticus* Bremer larva on Gramineæ. S. E.?
14. *Ochlodes venata herculea* Butler larva on *Miscanthus* (Gramineæ). S. L.
15. *Ochlodes ochracea rikuchina* Butler larva on *Oplismenus* (Gramineæ). D. L.
16. *Hesperia comma florinda* Butler larva on *Carex* (Cyperaceæ). S. E.
17. *Potanthus flava* Murray larva on *Setaria, Miscanthus, Oplismenus etc.* (Gramineæ). D. L.
18. *Thoressa varia varia* Murray and *T. obscura* larva on *Arundinaria, Pleioblastus, Sasa* etc. (Gramineæ). D. L.
19. *Polytremis pellucida* Murray larva on *Arundinaria, Shibatæa, Pleioblastus, Oryza, Miscanthus,* etc. (Gramineæ). D. L.
20. *Pelopidas mathias oberthüri* Evans larva on *Oryza, Miscanthus,* etc. (Gramineæ). D. L.
21. *Pelopidas jansonis* Butler larva on *Miscanthus,* etc. (Gramineæ). D. L.
22. *Parnara guttata* Bremer & Grey larva on *Oryza, Imperata, Setaria,* etc. (Gramineæ). D. L.

PAPILIONIDÆ

1. *Lühdorfia puziloi yessoensis* Rothschild and *L. inexpecta* Sheljuzhko larva on *Asiasarum* (Aristolochiaceæ). S. P.
2. *Lühdorfia japonica* Leech larva on *Heterotropa, Japonasarum, Asiasarum* (Aristolochiaceæ). S. P.
3. *Parnassius stubbendorfii hoenei* Schweitzer larva on *Corydalis* (Papaveraceæ). S. E.
4. *Parnassius glacialis glacialis* Butler and *P. mikado* Bryk & Eisner larva on *Corydalis* (Papaveraceæ). S. E.
5. *Parnassius eversmanni daisetsuzana* Matsumura larva on (F) *Dicentra* (Papaveraceæ). S. E. (1st winter) and P. (2nd winter).
6. *Menelaides alcinous* Klug larva on *Aristolochia, Hocquartia* (Aristolochiaceæ). D. P.
7. *Graphium sarpedon nipponum* Fruhstorfer larva on *Cinnamonum, Machilus, Neolitsea* (Lauraceæ). D. P.
8. *Graphium doson albidum* Wileman larva on *Michelia, Magnolia* (Magnoliaceæ). D. P.
9. *Papilio machaon hippocrates* Felder & Felder larva on *Angelia, Cryptotænia, Daucus, Fœniculum, Glehnia,* etc. (Umbelliferæ); *Phellodendron,* etc. (Rutaceæ). D. P.
10. *Papilio xuthus* Linné. larva on *Citrus, Fagara, Phellodendron, Poncris, Zanthoxylum,* etc. (Rutaceæ). D. P.
11. *Papilio macilentus* Janson larva on *Orixa, Fagara, Zanthoxylum, Poncris,* etc. (Rutaceæ). D. P.
12. *Papilio protenor demetrius* Cramer larva on *Citrus, Poncris, Zanthoxylum,* etc. (Rutaceæ). D. P.
13. *Papilio memnon thunbergii* von Siebold larva on *Citrus, Poncris,* etc. (Rutaceæ). D. P.
14. *Papilio helenus nicconicolens* Butler larva on *Citrus, Fagara,* etc. (Rutaceæ). D. P.
15. *Papilio bianor dehaanii* Felder & Felder larva on *Orixa, Phellodendron, Fagara, Zanthoxylum, Poncris,* etc. (Rutaceæ). D. P.
16. *Papilio maackii tutanus* Fenton and *P. satakei* Matsumura larva on *Phellodendron, Orixa,* etc. (Rutaceæ). D. P.

PIERIDÆ

1. *Leptidea amurensis* Ménétriès larva on *Vicia, Lotus, Lathyrus* (Leguminosæ). D. P.
2. *Leptidea morsei* Fenton larva on *Vicia* (Leguminosæ). D. P. ?
3. *Eurema hecabe mandarina* l'Orza larva on *Lespedeza, Cæsalpinia, Acacia, Albizzia, Æachynomene,* etc. (Leguminosæ). D. A.
4. *Eurema læta bethesba* Janson larva on *Cassia* (Leguminosæ). D. A.
5. *Gonepteryx rhamni maxima* Butler larva on *Rhamnus* (Rhamnaceæ). S. A.
6. *Gonepteryx mahaguru niphonica* Verity larva on *Rhamnus* (Rhamnaceæ). S. A.
7. *Colias erate poliographus* Motschulsky larva on *Glycine, Hedysarum, Indigofera, Lupinus, Lotus, Medicago, Pisum, Robinia, Trifolium,* etc. (Leguminosæ). D. L.
8. *Colias palæno aias* Fruhstorfer larva on *Vaccinium* (Ericaceæ). S. L.
9. *Anthocaris cardamines isshikii* Matsumura larva on (F) *Arabis, Barbarea,* etc. (Cruciferæ). S. P.
10. *Anthocaris scolymus* Butler larva on (F) *Arabis, Brassica, Cardamine, Rorippa* (Cruciferæ) S. P.
11. *Hebomoia glaucippe liukiuensis* Fruhstorfer larva on *Cratæva* (Capparidaceæ). D. L.
12. *Pieris rapæ crucivora* Boisduval larva on *Arabis, Brassica, Raphanus, Wasabia,* etc. (Cruciferæ); *Cleome* (Capparidaceæ); *Reseda* (Resedaceæ). D. P.
13. *Pieris napi pseudomelete* Verity and *P. n. japonica* Shirozu larva on *Arabis, Cardamine,* etc. (Cruciferæ). D. P.
14. *Pieris melete melete* Ménétriès and *P. m. pseudonapi* Verity larva on *Arabis, Raphanus, Brassica, Wasabia,* etc. (Cruciferæ). D. P.

15. *Pieris canidia juba* Fruhstorfer ?larva on Cruciferæ. D. P. ?
16. *Aporia hippia japonica* Matsumura larva on *Berberis* (Berberidaceæ). S. L.
17. *Aporia cratægi adherbal* Fruhstorfer larva on *Chænomeles, Cratægus, Malus, Pyrus, Prunus,* etc. (Rosaceæ). S. L.

LYCÆNIDÆ

1. *Curetis acuta paracuta* de Nicéville larva on (F) *Wistaria, Milletia, Pueraria, Sophora* (Leguminosæ). D. A.
2. *Arhopala japonica* Murray larva (M) on *Cyclobalanopsis, Quercus* (Fagaceæ). D. A.
3. *Arhopala ganesa loomisi* Pryer larva (M) on *Cyclobalanopsis* (Fagaceæ). S. A.
4. *Arhopala bazalus turbata* Butler larva (M) on *Lithocarpus, Kuromatea* (Fagaceæ). D. A.
5. *Artopoëtes pryeri* Murray larva on *Ligustrum* (Oleaceæ). S. E.
6. *Coreana raphælis* Oberthür larva on *Fraxinus* (Oleaceæ). S. E.
7. *Coreana ibara* Butler larva on *Fraxinus* (Oleaceæ). S. E.
8. *Japonica lutea* Hewitson larva on *Quercus* (Fagaceæ). S. E.
9. *Japonica sæpestriata* Hewitson larva on *Quercus, Castanea* (Fagaceæ). S. E.
10. *Araragi entheum* Janson larva on *Juglans* (Juglandaceæ). S. E.
11. *Antigius attilia* Bremer larva on *Quercus* (Fagaceæ). S. E.
12. *Antigius butleri* Fenton larva on *Quercus* (Fagaceæ). S. E.
13. *Wagimo signata signata* Butler and *W. quercivora* Staudinger larva on *Quercus* (Fagaceæ). S. E.
14. *Shirôzua jonasi* Janson larva (carnivorous) on oak-aphids. S. E.
15. *Iratsume orsedice* Butler larva on *Hammamelis* (Hammamelidaceæ). S. E.
16. *Favonius orientalis* Murray larva on *Quercus* (Fagaceæ). S. E.
17. *Favonius yuasai* Shirôzu larva on *Quercus* (Fagaceæ). S. E.
18. *Favonius jezoensis* Matsumura larva on *Quercus* (Fagaceæ). S. E.
19. *Favonius hayashii* Shirôzu larva on *Quercus* (Fagaceæ). S. E.
20. *Favonius ultramarinus* Fixsen larva on *Quercus* (Fagaceæ). S. E.
21. *Favonius saphirinus* Staudinger larva on *Quercus* (Fagaceæ) S. E.
22. *Favonius fujisanus* Matsumura larva on *Fagus* (Faqaceæ). S. E.
23. *Neozephyrus taxila regina* Butler, *N. t. japonicus* Murray, and *N. t. monticola* Shirôzu larva on *Alnus* (Betulaceæ). S. E.
24. *Neozephyrus aurorinus* Oberthür larva on *Quercus* (Fagaceæ). S. E.
25. *Neozephyrus smaragdinus* Bremer larva on *Prunus* (Rosaceæ). S. E.
26. *Neozephyrus hisamatsusanus* Nagami & Ishiga ?larva on *Fagaceæ.* S. E. ?
27. *Neozephyrus ataxus kirishimaensis* Okajima larva on *Cyclobalanopsis* (Fagaceæ). S. E.
28. *Rapala arata* Bremer larva (M) on (F) *Wistaria* (Leguminosæ); *Deutzia* (Saxifragaceæ); *Rosa* (Rosaceæ); *Vaccinium* (Ericaceæ); *Palura* (Symplocaceæ); *Rhamnus* (Rhamnaceae). D. P.
29. *Strymonidia w-album fentoni* Butler larva on *Ulmus* (Ulmaceæ); *Prunus* (Rosaceæ). S. E.
30. *Strymonidia merus* Janson larva on *Rhamnus* (Rhamnaceæ). S. E.
31. *Strymonidia pruni jezoensis* Matsumura larva on *Prunus* (Rosaceæ). S. E.
32. *Ahlbergia ferrea* Butler larva on (F) *Viburnum* (Caprifoliaceæ); *Rhododendron* (Ericaceæ); *Malus* (Rosaceæ). S. P.
33. *Spindasis takanonis* Matsumura mature larva fed orally by host ants in their nests on *Pinus, Prunus, Elæagnus.* S. L.
34. *Lycæna phlæas daimio* Seitz larva on *Rumex* (Polygonaceæ). D. L.
35. *Taraka hamada* Druce larva (carnivorous) on bamboo woolly aphis, *Oregma japonica* (Eriosomatidæ). D. L.
36. *Niphanda fusca shijima* Fruhstorfer larva in 1st 2 instars feeds on the excretion of dwarf-oak aphis, *Greenidea kuwanai* and in later instars is fed orally by the host-ants, *Camponotus herculeanus japonicus.* S. L.

37. *Lampides boeticus* Linné larva (M) on (F) *Dolichos, Phaseolus, Vicia,* etc. (Leguminosæ). D. Migratory.
38. *Nacaduba kurava septentrionalis* Shirôzu larva on *Bladhia* (Myrsinaceæ). D. ?
39. *Zizeeria maha argia* Ménétriès larva (M) on *Oxalis* (Oxalidaceæ). D. L.
40. *Zizina otis alope* Fenton larva (M) on *Lotus, Indigofera, Lespedeza* (Leguminosæ). D. L.
41. *Scolitantides orion jezoensis* Matsumura larva (M) on *Sedum* (Crassulaceæ). S. P.
42. *Sinia divina barine* Leech larva (M) on (F) *Sophora* (Leguminosæ). S. P.
43. *Glaucopsyche lycormas* Butler larva (M) on *Vicia* (Leguminosæ). S. ?
44. *Maculinea euphemus shiriyensis* Matsumura and *M. e. kazamoto* Druce larva (M) on (F) *Sanguisorba* (Rosaceæ) and later (carnivorous) on ant-grubs and eggs of *Myrmica* (Formicidæ). S. L.
45. *Maculinea arionides takamukui* Matsumura larva (M) on (F) *Isodon* (Labiatæ) and later (carnivorous) on ant-grubs and eggs of *Myrmica?* (Formicidæ). S. L.
46. *Celastrina argiolus ladonides* l'Orza larva (M) on (F) *Wistaria, Sophora, Robinia, Lespedeza,* etc. (Leguminosæ); *Malus, Prunus* (Rosaceæ). D. P.
47. *Celastrina sugitanii* Matsumura larva (M) on (F) *Æsculus* (Hippocastanaceæ). S. P.
48. *Celastrina puspa umenois* Matsumura larva (M) on *Pieris* (Ericaceæ), *Glochidion* (Euphorbiaceæ), *Rosa* (Rosaceæ). D. P. ?
49. *Celastrina albocærulea sauteri* Fruhstorfer larva on (F) *Prunus* (Rosaceæ), *Dicalix* (Symplocaceæ), *Ilex* (Aquifoliaceæ), *Viburnum* (Caprifoliaceæ). D. L./P.
50. *Everes argiades seitzi* Wnukowsky larva (M) on (F) *Lespedeza, Indigofera, Pisum, Pueraria, Trifolium Medicago, Phaseolus,* etc. (Leguminosæ); *Humulus* (Moraceæ). D. L.
51. *Everes lacturnus kawaii* Matsumura larva (M) on *Vicia* (Leguminosæ). D. L.
52. *Tongeia fischeri* Eversmann larva (M) on *Sedum* (Crassulaceæ). D. L.
53. *Plebejus argus micrargus* Butler larva (M) on *Synurus,* etc. (Compositæ). S. E.
54. *Lycæides argyrognomon præterinsularis* Verity larva (M) on (F) *Indigofera* (Leguminosæ). D. E.
55. *Lycæides subsolana yagina* Strand larva (M) on *Vicia* (Leguminosæ). S. E.
56. *Lycæides yarigadakeana* Matsumura larva (M) on *Astragalus, Hedysarum* (Leguminosæ). S. E.
57. *Lycæides iburiensis* Butler ?larva on Leguminosæ. S. ?
58. *Vaciniina optilete daisetsuzana* Matsumura ?larva on *Vaccinium* (Ericaceæ). S. ?

LIBYTHEIDÆ

1. *Libythea celtis celtoides* Fruhstorfer larva on *Celtis* (Ulmaceæ). S. A.

DANAIDÆ

1. *Caduga tytia niphonica* Moore larva on *Marsdenia, Metaplexis* (Asclepiadaceæ). D. P.

NYMPHALIDAE

1. *Boloria thore jezoensis* Matsumura larva on *Viola* (Violaceæ). S. L.
2. *Boloria iphigenia* Graeser ?larva on *Viola* (Violaceæ). S. L. ?
3. *Boloria freija asahidakeana* Matsumura larva on *Sieversia* (Rosaceæ). S. L.
4. *Brenthis daphne rabdia* Butler larva on *Sanguisorba* (Rosaceæ). S. L.
5. *Brenthis ino tigroides* Fruhstorfer larva on *Filipendula* (Rosaceæ). S. L.
6. *Argynnis paphia geisha* Hemming larva on *Viola* (Violaceæ). S. L.
7. *Argynnis sagana liane* Fruhstorfer larva on *Viola* (Violaceæ). S. L.
8. *Argynnis anadyomene midas* Butler larva on *Viola* (Violaceæ). S. E.
11. *Argynnis charlotta basalis* Matsumura and *A. c. fortuna* Janson larva on *Viola* (Violaceæ). S. L.
12. *Argynnis laodice japonica* Ménétriès larva on *Viola* (Violaceæ). S. L.
13. *Argynnis ruslana* Motschulsky larva on *Viola* (Violaceæ). S. E.

14. *Argynnis hyperbius* Linné larva on *Viola* (Violaceæ). D. L.
15. *Limenitis populi jezoensis* Matsumura larva on *Populus* (Salicaceæ). S. L.
16. *Limenitis camilla japonica* Ménétriès larva on *Lonicera* (Caprifoliaceæ). D. L.
17. *Limenitis glorifica* Fruhstorfer larva on *Lonicera* (Caprifoliaceæ). D. L.
18. *Neptis aceris oda* Fruhstorfer and *N. a. passerculus* Fruhstorfer larva on *Lespedeza, Robinia, Rhynchosia, Milletia, Wistaria, Glycine* (Leguminosæ). D. L.
19. *Neptis philyra excellens* Butler larva on *Acer* (Aceraceæ). S. L.
20. *Neptis alwina kæmpferi* l'Orza larva on *Prunus* (Rosaceæ). S. L.
21. *Neptis cœnobita aino* Shirôzu and *N. c. insularum* Fruhstorfer larva on *Spiræa* (Rosaceæ). S. L.
22. *Neptis pryeri* Butler larva on *Spiræa* (Rosaceæ). D. L.
23. *Melitæa ambigua niphona* Butler larva on *Melampyrum, Siphonostegia, Veronicastrum* (Scrophalariaceæ); *Plantago* (Plantaginaceæ). S. L.
24. *Melitæa protomedia* Ménétriès larva on *Valeriana* (Valerianaceæ). S. L.
25. *Melitæa phoebe scotosia* Butler larva on *Cirsium, Serratula* (Compositæ). S. L.
26. *Araschnia levana obscura* Fenton larva on *Laportea, Urtica* (Urticaceæ). D. P.
27. *Araschnia burejana strigosa* Butler larva on *Boehmeria, Urtica* (Urticaceæ). D. P.
28. *Polygonia c-aureum* Linné larva on *Humulus* (Moraceæ). D. A.
29. *Polygonia c-album hokkaidensis* Nomura and *P. c. hamigera* Butler larva on *Ulmus, Celtis* (Ulmaceæ); *Humulus* (Moraceæ); *Ribes* (Saxifragaceæ). D. A.
30. *Polygonia l-album samurai* Fruhstorfer larva on *Betula* (Betulaceæ). S. A.
31. *Kaniska canace no-jaconicum* von Siebold larva on *Lilium, Tricyrtis, Streptopus, Smilax* (Liliaceæ). D. A.
32. *Nymphalis antiopa asopos* Fruhstorfer larva on *Salix, Toisusu* (Salicaceæ). S. A.
33. *Nymphalis xanthomelas japonica* Stichel larva on *Celtis* (Ulmaceæ); *Salix* (Salicaceæ). S. A.
34. *Nymphalis io geisha* Stichel larva on *Humulus* (Moraceæ); *Urtica* (Urticaceæ). D. A.
35. *Aglais urticæ connexa* Butler larva on *Laportea, Urtica* (Urticaceæ). S. A.
36. *Vanessa cardui* Linné larva on *Arctium, Gnaphalium* etc. (Compositæ); *Glycine* etc. (Leguminosæ). D. A.
37. *Vanessa indica* Herbst larva on *Boehmeria, Urtica* (Urticaceæ); *Humulus* (Moraceæ); *Ulmus* (Ulmaceæ). D. A.
38. *Precis orithya* Linné ?larva on *Antirrhium* (Scrophulariaceæ). D. A. ?
39. *Hypolimnas misippus* Linné ?larva on *Ficus* (Moraceæ). ? ?
40. *Cyrestis thyodamas mabella* Fruhstorfer larva on *Ficus* (Moraceæ). D. A.
41. *Dichorragia nesimachus nesiotes* Fruhstorfer larva on *Meliosma* (Sabiaceæ). D. P.
42. *Apatura ilia substituta* Butler larva on *Salix, Populus* (Salicaceæ). D. L.
43. *Hestina japonica* Felder & Felder larva on *Celtis* (Ulmaceæ). D. L.
44. *Sasakia charonda* Hewitson larva on *Celtis* (Ulmaceæ). S. L.

SATYRIDÆ

1. *Ypthima argus* Butler larva on *Oplismenus,* etc. (Gramineæ). D. L.
2. *Ypthima motschulskyi* Bremer & Grey larva on *Digitaria,* etc. (Gramineæ). D. L.
3. *Erebia niphonica* Janson larva on *Carex* etc. (Cyperaceæ). S. L.
4. *Erebia ligea takanonis* Matsumura larva on *Carex* (Cyperaceæ). S. L.
5. *Œneis asamana* Matsumura larva on *Carex* (Cyperaceæ). S. L (2 winters).
6. *Œneis daisetsuzana* Matsumura larva on Cyperaceæ. S. L.
7. *Satyrus dryas bipunctatus* Motschulsky larva on *Agrotis, Poa* (Gramineæ). D. L.
9. *Pararge achine achinoides* Butler larva on Gramineæ and Cyperaceæ. S. L.
10. *Lethe callipteris* Butler larva on *Pleioblastus,* etc. (Gramineæ). S. L.
11. *Lethe sicelis* Hewitson larva on *Pleioblastus,* etc. (Gramineæ). D. L.
12. *Lethe diana* Butler larva on *Pleioblastus,* etc. (Gramineæ). D. L.
13. *Lethe marginalis* Motschulsky larva on *Miscanthus,* etc (Gramineæ). S. L.
14. *Aranda schrenckii menalcas* Fruhstorfer larva on *Carex* (Cyperaceæ). S. L.
15. *Aranda epaminondas* Staudinger larva on Gramineæ. S. L.

16. *Neope goschkevitschii* Ménétriès larva on *Pleioblastus* (Gramineæ). D. P.
17. *Mycalesis gotama fulginia* Fruhstorfer larva on *Oryza, Oplismenus,* etc. (Gramineæ). D. L.
18. *Mycalesis francisca perdiccas* Hewitson larva on *Oplismenus,* etc. (Gramineæ). D. L.
19. *Cœnonympha œdippus annulifer* Butler larva on Cyperaceæ. S. L.
20. *Cœnonympha hero neoperseis* Fruhstorfer larva on Cyperaceæ. S. L.
21. *Melanitis leda* Linné ?larva on Gramineæ. D. A.?
22. *Melanitis phedima oitensis* Matsumura larva on *Miscanthus, Zea, Coix, Setaria, Saccharum,* etc. (Gramineæ). D. A.

4 Shinhanacho, Hongo, Tokyo, JAPAN

THE NAMING OF SUBSPECIES IN LEPIDOPTERA

The great proliferation of subspecific names within the Lepidoptera in the past twenty-five years has posed a problem which the authors feel is important to all lepidopterists. The purpose of this note is not to condemn the practice of naming subspecies but rather to propose that the following partly accepted criteria be observed more consistently by those who would describe new races.

1. That new subspecies be named primarily in papers which discuss the geographic variation of the entire species as fully as possible.

2. That isolated descriptions of subspecies be made only in such species as have already been analyzed in the above manner.

We feel that the advantages to be gained from such a procedure are considerable. In the first place, this would cut down the naming of populations later found to be intermediate in a cline. Secondly, it would gather the names applied to the subspecies of a species together into a few rather than many scattered publications. Thirdly, and perhaps most important, it would reduce the necessity for later writers of synonomizing numerous names found not worthy of retention when the whole species population is reviewed. One only needs to look at the taxonomy of a genus like *Parnassius* to see the terrific systematic confusion that can result from ill-considered, over-enthusiastic naming of infraspecific entities. We sincerely hope that the above criteria will be followed in the naming of subspecies in order that a ponderous accumulation of trivial names in the Lepidoptera can be avoided.

NICHOLAS W. GILLHAM, Biology Labs., Harvard University, Cambridge 38, Mass., U.S.A.
PAUL R. EHRLICH, Dept. of Entomology, University of Kansas, Lawrence, Kans., U.S.A.

FIELD AND TECHNIQUE NOTES

SOME HOST PLANT RECORDS DERIVED FROM REARING EXPERIMENTS

In attempts to induce *Strymon melinus* Hbn. to oviposit in captivity I tried all the host plants (*Rubus, Cratægus, Malvus,* and *Humulus*) given in JONES' Check List of B.C. Macrolepidoptera, except *Humulus* which is not obtainable here. A single egg was laid on fruit of raspberry, which was lost due to the berry rotting before it hatched.

I finally decided to watch unconfined butterflies for clues. I would have saved much trouble by trying this sooner. After a few minutes' watching I had observed two females of *S. melinus* ovipositing in the flowers of small wild clovers. The ova were pushed well into the corollas of the flowers. In the keys of HENRY'S Flora of B.C. the plants run to *Trifolium oliganthum* Steud. and *T. tridentatum* Lindl. When captive *S. melinus* females were tried with these plants they oviposited freely.

The larvæ are inveterate cannibals, so I did not rear very many. When not eating their companions, they ate only the flowers or seed pods of the clover, never the leaves.

Mitoura nelsoni Edw. is never a common butterfly here, and I always hesitate to use good specimens in the breeding cages. One damaged, but seemingly fairly fresh, female taken at Wellington, I tried on every conifer locally obtainable, but without success. Later I brought a worn female from Cameron Lake. Having tried this one for a time with *Pinus* and *Picea* without success, I put in a twig of *Thuja plicata* Donn. On this the butterfly soon deposited three ova. Two of these hatched. One larva soon disappeared; I suspect cannibalism again. The remaining caterpillar I successfully brought to pupation on a diet of *T. plicata.*

From frequent watching of the insect, I had long been convinced in my own mind, that in this locality *Lycænopsis pseudargiolus echo* Edw. feeds chiefly on *Spiræa discolor* Pursh. I first put the theory to test in 1952. The butterflies oviposited on *S. discolor* flowers, but the young larvæ were lost due to the flowers dying and falling off. Cut *Spiræa* flowers are difficult to keep fresh. The following year I achieved success by carefully moving the ova onto fresh flowers. As is frequently the case with Lycænidæ, the larvæ feed on the flowers mainly, but with this species I did not notice any cannibalism.

As often happens with Arctiidæ, *Diacrisia pteridis rubra* Neum. oviposited without waiting to be supplied with the correct host plant. I tried *Pteris aquilina* L. and *Plantago lanceolata* L. Some of the small larvæ commenced feeding on the ferns, but in a few days all had transferred themselves to the plantain leaves. On this diet I reared them with very little mortality.

Newly hatched larvæ of *Lacinipolia comis* Grt. were supplied with leaves of cultivated clover, and commenced at once to feed on these. Since this is a common species, and I was at the moment concerned with rarer things, I pushed fresh clover leaves on top of the old, and hoped the larvæ would transfer themselves. On examining them a few days later, I found them still feeding happily on the old leaves, which were now nearly black. I would likely have taken the trouble to move them, if I had not noticed in JONES' List, under *Lacinipola pensilis* Grt. "Larva feeds on dead leaves, according to Dyar". Species of the same genus might have similar habits, so I left the *L. comis* larvæ alone. They thrived all summer on a diet of dead or half dry clover leaves and went into hibernation apparently in good health.

RICHARD GUPPY, Wellington, V.I., B.C., CANADA

ATTRACTION OF ZEBRA MALES BY FEMALE PUPÆ

Along the slope of Long Mountain, a ridge just southwest of the University College, there is a wood road through rather scrubby second growth which is an excellent place for butterflies. While walking along this on June 2nd, I noticed a group of Zebras (*Heliconius charitonius* Linné) fluttering around the base of a sapling. The object of interest was a pupa of the same species, suspended from a low twig, which was on the verge of eclosion (the wing bars were clearly visible through the pupal skin). A Passion Flower vine on a tree overhanging the sapling had numerous larvae of *H. charitonius* in various stages. During a period of about 45 minutes there were one or two Zebras resting on the pupa almost constantly (not always the same ones), and several others flitting close by and attempting to settle on it. All those examined were males.

The pupa was taken home, and a female emerged the following day. During the following two weeks, three other pupæ were found at the same place, each being located by the adults fluttering nearby. Two of these pupæ produced females; the sex of the third was not determined.

This looks like a case of sex attraction, but I have not yet been able to observe whether or not male pupæ receive similar attention. I hope to investigate this point later.

PETER F. BELLINGER, University College of the West Indies,
Mona, St. Andrew, Jamaica, B. W. I.

LYCÆNA THOË IN MISSISSIPPI

On 27 April 1951, I collected a single specimen of *Lycæna thoë* Guérin near Pace, Bolivar County, Mississippi. The specimen has been examined by Mr. HARRY K. CLENCH of the Carnegie Museum who comments as follows: "A female in excellent condition, and a remarkable capture. I cannot get over the feeling that this is a stray, though its good condition, not to mention the early date of its capture, belies that notion. It seems to be typical, although the hindwing underside is a bit whiter than usual."

The southern extent of the range of this species was given by KLOTS in his *Field Guide* (p. 152) as: to New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Kansas. The CLARKS (*Smiths. Misc. Coll.* 116: no. 7: p. 72; 1951) noted that it had been taken in the District of Columbia and Maryland and probably will be found in Virginia.

The specimen was taken at 1 P. M. on pink clover at the side of Mississippi State Highway No. 8. The locality is in the "Delta" section of Mississippi, a little more than 100 miles southwest of Memphis, Tennessee and about the same distance north of Vicksburg and southeast of Little Rock, Arkansas. I have found no previous records of this species from Mississippi or from any other southern state. WAGNER (*Ent. News* 54: p. 11; 1943) noted that in 1943 this species was known from Beltsville, Maryland, by only a single specimen even though that locality had been studied for years.

BRYANT MATHER, P. O. Drawer 2131, Jackson, Miss., U. S. A.

1952 CAPTURES IN QUEBEC

Certain captures of the 1952 season of special interest failed to appear in the Season Summary for that year and are here presented. *Cœnonympha tullia inornata* Edw. was caught on 21 June at the Morgan Arboretum of Macdonald College. One specimen of *Eumarozia malachitana* Zell. came into my light trap on 9 August; Dr. T. N. FREEMAN at Ottawa tells me that this insect has not been recorded east of Lake Erie before. One specimen of *Crocidophora serratissimalis* Zell. also entered the trap, on 6 July; Dr. E. G. MUNROE noted for it: 'a scarce species'.

P. H. H. GRAY, Box 236, Macdonald College, Que., CANADA

FURTHER NOTES ON THE MIGRATION AND BREEDING OF *NYMPHALIS CALIFORNICA*

The reports by WHITTAKER, FENDER, and BAKER on a migration of *Nymphalis californica* Bdv. *(Lepid. News,* vol.7: pp. 9, 10, 15) I found very interesting in view of my experience with this species during the week of August 3, 1952, in Trinity and Siskiyou Counties of northern California.

Mr. J. DUNCAN GRAHAM, science teacher of the Benicia High School, and I were enroute on a trout fishing trip to a cabin in the Klamath National Forest when the migration was first noted about the town of Weed where *N. californica* were present in such large numbers that the migration was the topic of conversation in that area. The radiator grills of automobiles and the streets were littered with the bodies of migrants which had been struck and injured or killed by cars.

The migrants were traveling in a northwesterly direction at low elevation, two to six feet, which at the town of Weed was from nearby Mount Shasta.

During our fishing in the forest area along the South Fork of the Salmon River and its tributaries there was no observation of *N. californica* except for two or three stragglers during the five days. Enroute back to civilization from this wilderness area the trail took us past the Trail Creek mine, nearly 7000 feet elevation. Here, *Nymphalis* was again exceedingly abundant; however instead of migrating they were fluttering about and lighting on the blooms of a low plant of the mint family.

Adjacent to the mine was a heavy growth of brush. Practically all of the bushes in at least this fifteen acre area were entirely denuded of foliage, as though stripped by a fire. Robins, bluebirds, and jays and probably other birds were feeding on the millions of chrysalides of *Nymphalis* hanging from the denuded branches of *Ceanothus, Manzanita,* and other native shrubs some six feet in height. Because of the disturbance by the birds, the chrysalides appeared to be cognizant of danger as they were vigorously swaying as far as their attachments to the branches allowed. In fact, one of the gold-mine caretakers mistook the swaying action as caused by wind passing through the denuded brush. Only a few of the velvety black, dotted and lined caterpillars had not yet reached the chrysalis stage.

I picked a few twigs about ten inches each in length, bearing dozens of chrysalides, with the intention of finding if they would complete the metamorphosis to butterflies at the lower level of my home in Benicia, California. However, due to the heat of the Sacramento Valley through which I had to travel to reach my home, or because of the low altitude, near sea level, they all died without further development.

I have experienced other migrations of this species in California but this was the greatest breeding concentration of this or any species of Lepidoptera I have witnessed in forty years of interest in this science.

EMERSON A. STONER, 285 East L Street, Benicia, Calif., U.S.A.

ON TRANSPORTING LEPIDOPTERA SAFELY

Two summers ago, while camping in the Sierra Nevada of California, I was confronted with the problem of transporting the Lepidoptera I had collected over trails by back pack and mule train. This problem was solved very simply and satisfactorily by taking two tin cans, a number 303 can and one a little larger, and telescoping the smaller can into the larger one. This whole container was then wrapped in paper and tied together. Small envelopes about 2¼ by 4 inches fit into the cans very well (I used church envelopes!) and the curvature of the container keeps these envelopes from being shaken about. The telescoped cans give surprising strength and also good protection against parasites. In fact, I've found this method of storing and packing insects so effective that I now use it at home as standard practice.

THOMAS FRYXELL, 1331 42nd Ave., Rock Island, Ill., U. S. A.

LEPIDOPTERA LARVÆ AND PUPÆ TRANSFERRED FROM HARVARD M. C. Z. TO YALE UNIVERSITY

For several years we have concentrated on developing at Yale University a study and reference collection of Lepidoptera larvæ and pupæ, carefully preserved in alcohol. These are from all parts of the world and include species in all the major groups of Lepidoptera, although the Rhopalocera are especially well represented. It is a high satisfaction to announce that the entire collection of similarly preserved material from the Museum of Comparative Zoology at Harvard University has been transferred to Yale and is being sorted into the Yale collection. The majority of the Harvard specimens were obtained during the 19th Century by LOUIS AGASSIZ, HERMAN HAGEN, SAMUEL H. SCUDDER, A. S. PACKARD, JR., and W. H. EDWARDS. More than 60 vials of Lepidoptera had been collected and labelled by EDWARDS, presumably for SCUDDER. Thus they have considerable historical interest in addition to their taxonomic value. Among the more recent acquisitions were Latin American specimens preserved by MARSTON BATES and G. B. FAIRCHILD.

The collection contained about 800 vials, about one-third of which have Rhopalocera. About one-half of the vials have North American specimens; one-fourth are of European origin.

We are grateful to our friends at Harvard for presenting us with this fine research material. We also feel that we are contributing by making it available for reference for all students of immature Lepidoptera. Proper care and arrangement of this collection proved to be impractical at Harvard, as Dr. DARLINGTON explains in the following statement which he asked us to publish. Such a cooperative arrangement as this is rare in the history of friendly relations between museums, and we are fortunate to be so favored.

CHARLES L. REMINGTON, Research Associate in Entomology,
Peabody Museum of Natural History,
Yale University, New Haven 11, Conn., U. S. A.

As Curator in Insects at the Museum of Comparative Zoology, I am responsible for maintaining an enormous collection of insects, for increasing it when possible, and for making it available for use. The staff here is capable, but very small. We are able to maintain the collection as a whole, but an occasional detail of it is beyond our power. One thing we have been unable to do is to make proper use of our old, unarranged, and largely unidentified collection of larvæ of Lepidoptera in alcohol. Recently this collection was partly sorted by a competent young lepidopterist, and then I myself tried to weed out what was worthless and put the rest in order, but I could not do it. Therefore, with the Director's approval, I have turned this material over to Prof. REMINGTON for Yale University. The material transferred consists only of larvæ and pupæ in alcohol, which were kept separate from the main Lepidoptera collection. Inflated larvæ and larvæ in alcohol associated with adult specimens in the collection have not been transferred. Moreover, the arrangement with Prof. REMINGTON is that if any of the larvæ turn out to be of primarily taxonomic importance — for example types of described species — they will be returned here.

I am publishing this note to make very clear the reason for the transfer. We transferred this material only after making a real effort to make it available for use here and finding that we could not, and because we thought that, incorporated into the large and growing collection of immature stages of Lepidoptera at Yale, it would be immediately available to all interested entomologists. We have a fine collection of Lepidoptera as well as of other orders of insects, we value it highly, and we intend to continue to maintain it, improve it, and make it useful.

P. J. DARLINGTON, JR.
Curator of Insects, Museum of Comparative Zoology,
Harvard University, Cambridge 38, Mass., U. S. A.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed publications on Lepidoptera from all scientific periodicals available to our cooperating abstractors. It is intended that every paper and book related to Lepidoptera and published in any part of the world after 1946 will be included. ***Abstracts give all new species, subspecies, genera, and higher categories, with type localities and generotypes, but varieties, aberrations, etc. are omited.*** Papers from *The Lepidopterists' News* are listed but not abstracted. Initials of cooperating abstractors are as follows: [P.B] — P. F. BELLINGER; [A.D.] — A. DIAKONOFF; [W.H.] — WALTER HACKMAN; [N.O.] — NICHOLAS OBRAZTSOV; [J.T.] — J. W. TILDEN; [P.V.] — PIERRE E. L. VIETTE.

A. GENERAL WORKS

Carpenter, F. M., "The geological history and evolution of insects." *Amer. Sci.,* vol. 41: pp. 256-270, 7 figs. April 1953. General account, based on the fossil record. [P.B.]

Perkins, Lilly, "Butterflies and moths." *In* Natural History Society of Jamaica *Glimpses of Jamaican Natural History,* vol. 1, 2nd ed.: pp. 36-39. 1949. General remarks on Lepidoptera, referring to several local species. [P.B.]

Various authors, "Insects." *U. S. Dept. Agric. Yearbook 1952*: 780 pp., 72 pls., figs. A collection of short articles by specialists on various aspects of general and economic entomology; color plates show life history of economically important species. [P.B.]

B. SYSTEMATICS AND NOMENCLATURE

d'Almeida, R. Ferreira , "Duas novas subespecies de Rhopalocera de America (Lep. Satyridæ e Nymphalidæ)" [in Portuguese]. *Bol. Mus. Nac. Rio de Janeiro, Zool.,* no. 114: 3 pp., 2 figs. 15 Sept. 1952. Describes as new *Dynamine mylitta mexicana* (Presidio, Mexico); ***Euptychia acirrhoë interjecta*** (Três Rios, Jacarépaguá, Rio, D. F., Brazil). Figures adults. [P.B.]

d'Almeida, R. Ferreira, "Novas especies sul-americanas da familia Ithomiidæ (Lep. Rhopalocera)" [in Portuguese]. *Bol. Mus. Nac. Rio de Janeiro, Zool.,* no. 115: 4 pp., 2 pls. 15 Sept. 1952. Describes as new ***Hypothyris violantilla*** (Salôbra, S. Mato Grosso); ***Ithomia arduinna*** (Chapare, Bolivia); ***Hyposcada olerioides*** (Yungas de Palmar, Bolivia). Figures adults of last two, and ♂ genitalia of *Hypothyris colophonia* and *H. ninyas,* described previously. *Sais rosalia badia* Haensch a good subspecies. P.B.

Altena, C. O. van Regteren, "A revision of the genus *Nyctalemon* Dalman (Lepidoptera, Uraniidæ) with notes on the biology, distribution, and evolution of its species." *Zool. Verh. Mus. Leiden,* no. 19: 57 pp., 4 pls., 7 figs. 28 May 1953. There are two species groups. The *patroclus*-group occurring from the Moluccas to the New Hebrides contains five species, of which at least one is polytypic. Describes as new: ***N. toxopeusi*** (Moluccas to Bismarck Archipelago), and *N. mutatus* var. "fletcheri" (Solomon Is.). The *menœtius*-group occurring from India to Celebes contains two polytypic species. Describes as new: ***N. menœtius celebensis*** (Celebes), and ***N. m. adspersus*** (E. Borneo). Suggests placing on the Official List of Generic Names in Zoology the well known name *Nyctalemon,* although preoccupied by *Lyssa* Hübner. [A.D.]

Amsel, H. G., "Neue Kleinschmetterlinge aus Nordwest-Afrika" [in German]. *Bull. Inst. Franç. Afr. Noire,* vol. 15: pp. 1441-1460, 19 figs., 8 phot. 1953. Describes as new: *THYRIDOPSIS monotona* (Schœnobiinæ); *MEGALOPHYCITA albicostella, BRACHIOLODES ziczac* (Phycitinæ); *MACROPYRALIS gigantalis* (Pyralidinæ); *Macalla mauritanica* (Epipaschiinæ); *Cataonia mauritanica* (Pyraustinæ); *Symmoca solnella* (Gelechiidæ); *Coleophora saccharella, C. pisella* (Coleophoridæ); *Blastobasis cineracella* (Blastobasidæ); *PECTITINEA albonigrella, RUNGSIODES stenopterella* (Tineidæ). The new spp. are from Mauritania and Morocco. Location of types not given. [P.V.]

Anonymous, "À propos de *Hyponomeuta* (Microlépidoptères Hyponomeutidæ)" [in French]. *Rev. Franç Lépid.,* vol. 13: p. 166. "Jan/Feb." [31 May] 1952. Evidence for specific distinctness of *H. padellus* and *H. malinellus.* [P.B.]

Berger, L. A., "Les *Earias* Hb. du Congo belge (Lepidoptera - Phalænidæ (Noctuidæ auct.))" [in French]. *Rev. Zool. Bot. Afric.,* vol. 48: pp. 204-208. 1953. Describes as new *E. becqueti* (Urundi). Lists *E. biplaga, E. cupreoviridis, E. ansorgei, E. insulana* from Belgian Congo; key to species. [P.V.]

Berger, L. A., "Pieridæ nouveaux du Musée Royal du Congo Belge" [in French]. *Rev. Zool. Bot. Afric.,* vol. 48: pp. 209-210. 1953. Describes as new two sspp. from Belgian Congo: *Belenois victoria hecqi* (Kibali-Ituri) and *B. v. schoutedeni* (Kivu). [P.V.]

Bernardi, G., & H. de Lesse, "La variabilité géographique de *Lycæna helle* Denis et Schiff. (Lep. Lycænidæ)" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 203-213, 1 pl. "March/April" [25 July] 1952. Describes as new *L. h. arvernica* (Vallée du Chaudefour, France). Tabulates distribution of size and of pattern and color characters among 8 races and describes the latter (including two unnamed subspecies). [P.B.]

Bernardi, G., H. de Lesse, & J. Picard, "Liste des Grypocères et Rhopalocères de la faune française conforme aux Règles Internationales de la Nomenclature" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 241-246. "May/June/Sept." [15 Nov.] 1952. Completes the revised catalogue of French butterflies, with the Satyridæ and Libytheidæ. Lists genera, subgenera, species, generotypes, and important synonyms; notes on some doubtful systematic points. [P.B.]

Bourgogne, J., "Un *Oreopsyche* nouveau de la Péninsule Ibérique (Lep. Psychidæ)" [in French]. *Bull. Soc. Ent. France,* vol. 58: pp. 89-95, 6 figs. 1953. Description of a new species, *O. monteiroi* from Portugal (holotype) and Spain, and comparison with *O. moncaunella.* [P.V.]

Boursin, Ch., "Berichtigungen zum Aufsatz Boursin: 'Neue palæarktische *Agrotis*-Arten usw.' " [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 112-113. 15 July 1949. Corrections to paper in vol. 33, pp. 97-136, including list of 11 n. spp. (mostly *Diarsia*) not mentioned in the text whose genitalia were figured. [P.B.]

Box, Harold E., "New crambine genera allied to *Diatræa* Guilding (Lepidoptera: Pyralidæ). - I." *Proc. Roy. Ent. Soc. London B,* vol. 22: pp. 178-180. 15 Oct. 1953. Describes as new *EODIATRÆA* (type *Chilo centrellus* Möschler), including also *E. amnemonella, E. amazonica,* and *E. rufescens,* all transferred from *Diatræa. D. canella* a synonym of *E. centrella.* [P.B.]

Bradley, J. D., "Some important species of the genus *Cryptophlebia* Walsingham, 1899, with descriptions of three new species (Lepidoptera: Olethreutidæ)." *Bull. Ent. Res.,* vol. 43: pp. 679-689, 2 pls., 8 figs. Jan. 1953. Describes as new *C. vitiensis* (Vunidawa, Fiji); *C. williamsi* (Réduit, Mauritius); *C. pallifimbriana* (Natoon, Fiji). Transfers 10 spp. from *Argyroploce,* 1 from *Pogonozada,* 1 from *Platypeplus* to *Cryptophlebia.* Synonymizes *A. xylodelta* under *C. præsiliens.* Lists the 18 known spp., with taxonomic notes, distribution, and host plants; figures adults and genitalia of n. spp. and some others. [P.B.]

Brown, F. Martin, & William P. Comstock, "Some biometrics of *Heliconius charitonius* (Linnæus) (Lepidoptera, Nymphalidæ)." *Amer. Mus. Novit.,* no. 1574: 53 pp., 8 figs. 28 July 1952. Statistical study of populations, based on wing length, band width, frequency of occurrence of secondary pattern elements (spots), and color variation. This study, carried out by Brown from data supplied by Comstock and without reference to the actual specimens, supports Comstock's earlier division of the species into races by standard taxonomic procedure. [P.B.]

Caruel, M., "Les nouvelles règles de la nomenclature. Application au cas de *Maculinea arion* L. aberr. *obscura* Christ., et race *obscura* X." [in French]. *Lambillionea,* vol. 50: pp. 84-87. 25 Oct. 1950. Discusses ruling separating specific and infrasubspecific nomenclature, and its consequences; points out that *obscura* was originally applied to an aberration and that the authority for the subspecific name *M. a. obscura* is the author, not yet determined, who first applied this name to the dark mountain race. [P.B.]

Cary, Margaret M., "*Phlegethontius caribbeus,* a new sphynx moth from Haiti, West Indies." *Ent. News,* vol. 63: pp. 197-199. 1952. Described from a single female; type figured. [J.T.]

Chiarelli de Gahan, Angelina, "*Proxenus rionegrensis,* nuevo Lepidoptera de la Argentina (Lep. Noct. Acronyctinæ)" [in Spanish]. *Rev. Invest. Agric.,* vol. 3: pp. 397-402, 2 figs. "1949" [Aug. 1950]. Resdescribes genus and describes n. sp. (Rio Negro, Argentina). [P.B.]

Couchman, L. E., "Notes on some species of *Oreixenica* Waterhouse and Lyell (Lepidoptera, Satyridæ), with descriptions of new forms." *Proc. Roy. Ent. Soc. London B.*, vol. 22: pp. 73-84, 3 figs. 17 June 1953. Describes as new *O. paludosa nama* (Nimmitabel, S. E. Australia); *O. p. theodora* (Mt. Buffalo, S. E. Australia); *O. ptunarra* (Miena, Tasmania); *O. p. roonina* (Mike Howes Marsh, Tasmania); *O. p. angeli* (L. Leake, Tasmania); also names a new "form". Describes early stages of *O. p. angeli;* foodplant grass. Key to Tasmanian races of *Oreixenica.* [P.B.]

Daniel, Franz, "Beiträge zur Kenntnis der Arctiidæ Ostasiens unter besonderer Berücksichtigung der Ausbeuten von Dr. h. c. H. Höne aus diesem Gebiet (Lep.-Het.). III. Teil: Lithosiinæ" [in German]. *Bonn. Zool. Beitr.*, vol. 2: pp. 291-327, 1 pl. 24 figs. 1951. Gives an annotated list of 53 spp., chiefly from China. Describes as new *PAREUGOA* (type *P. grisescens* nov.), *AZURIDOIDES* (type *A. atuntseica* nov.) and further species and subspecies: *Stigmatophora likiangensis* (Likiang, Yunnan); *S. confusa* (Likiang, Yunnan); *S. obraztsovi* (mountains south of Wenchow, Chekiang); *S. chekiangensis* (West Tien-mu-shan, Chekiang); *Pareugoa grisescens* (Hang-Chow, Chekiang; ♀ allotype from Ling-ping, Kwang-tung); *Schistophleps lofaushanensis* (Lofau-shan, S. China); *Siccia kuangtungensis* (Ling-ping, Kwang-tung); *Parasiccia chinensis* (West Tien-mu-shan, Chekiang); *Asuridia yuennanica* (Likiang, Yunnan); *Asuridoides atuntseica* (A-tun-tse, Yunnan); *A. osthelderi* ("W. China"); *Miltochrista tibeta* (Batang, Tibet); *M. tsinglingensis* (Tapai-shan, S. Shen-si); *M. kuatunensis* (Kuatun, Fu-kien); *M. gilva* (Batang, Tibet); *M. longaria* (Wenchow, Chekiang); *M. variata* (type not fixed; the moths studied originated from Kwanh-sien, Szechuen, and Likiang, Yunnan); *M. atuntseensis* (A-tun-tse, Yunnan); *M. orientalis* (Kuatun, Fukien); *Hypeugoa flavogrisea orientalis* (West Tien-mu-shan, Chekiang); *Siccia taprobanis likiangensis* (Likiang, Yunnan); *Miltochrista tibeta clara* (Likiang, Yunnan); *M. pallida tapaishanica* (Tapai-shan, S. Shensi); *M. pallida formosana* (Formosa; type not fixed); *Miltochrista rosacea* mod. *flava* (Mien-shan, Shansi). Raises *Parasiccia maculifascia mokanshensis* Reich to full specific rank. Redescribes and discusses some known spp. Figures genitalia of 17 new spp., 2 new sspp., and 8 known spp.; 32 photographs of 17 new spp., 2 new sspp., and of 8 known spp. To be continued. [N.O.]

Daniel, Franz, "Freilandbeibachtungen an *Philea* Z.-und *Endrosa* Hbn.-Formen" [in German]. *Nachrbl. Bayer. Ent.*, vol. 1: pp. 27-29. 15 April 1952. Discusses taxonomy of some spp. on basis of habits. [N.O.]

Dasse, G., "Contribution à l'étude de trois espèces belges du genre *Cucullia* Schrank" [in French]. *Lambillionea,* vol. 50: pp. 81-84. 25 Oct. 1950. Distinction, in larval and adult stages, between *C. verbasci, C. scrofulariæ,* & *C. lychnitis;* foodplant preferences noted. [P.B.]

Dufrane, A., "Saturniidæ d'Afrique" [in French]. *Bull. Mens. Soc. Linn. Lyon,* vol. 22: pp. 247-252. 1953. Describes from Belgian Congo as new *Bunæa alberici, B. alcinoë katangensis, Imbrasia paradoxa.* No figures. [P.V.]

Ehrlich, Paul R., "A new subspecies of *Erebia epipsodea* Butler (Lepidoptera: Satyridæ)." *Ent. News,* vol. 63: pp. 225-231. 1952. Describes as new *E. e. remingtoni* (Yukon Territory). [J.T.]

Elferich, N. W., *Pontia daplidice* L." [in Dutch]. *Ent. Berichten,* vol. 15: pp. 1-3. 1 fig. 1 Jan. 1954.

Fender, Kenneth M., & Stanley G. Jewett, Jr., "Two new races of *Euphydryas anicia* Doubleday & Hewitson (Lepidoptera: Nymphalidæ)." *Wasmann Journ. Biol.,* vol. 11: pp. 115-120. 1953. Describes the subspecies *E. a. macyi* (Wildhorse Creek, Alvord Basin, Harney Co., Ore.) and *E. a. veazieæ* (Jackass Mts., Harney Co., Ore.). [J.T.]

Field, William D., "Moths of the genus *EPEIROMULONA,* a new genus of Lepidoptera." *Proc. U. S. Nat. Mus.,* vol. 102: pp. 455-469, 4 pls. 1952. Describes as new *EPEIROMULONA,* and type species *E. lephina* (Porto Bello, Colon Prov., Panama); also *E. biloba* (Rio Trinidad, Colón Prov., Panama), *E. h. hamata* (Cayenne, Fr. Guiana), *E. h. venezuelensis* (Las Qunguas, Esteban Valley, Venezuela), *E. h. colombiensis* (upper Rio Negro, Colombia), *E. h. brasiliensis* (Melguina, 10 mi. S. of Diamantino, Mato Grosso), *E. roseata* (between La Gloria and Cardel, Vera Cruz, Mexico), *E. thysanaba* (Cayenne, Fr. Guiana), *E. icterinus* (Cayuga, Guatemala); includes *Autoceras* (?) *phelina* Druce. Figures adults and genitalia. Key to spp. [P.B.]

Fleming, Henry, "The Saturnioidea (moths) of Rancho Grande, northcentral Venezuela." *Zoologica, N. Y.,* vol. 37: pp. 203-207. 31 Dec. 1952. Records 35 spp. (including 1 cercophanid, 3 oxytenids). Considers *Automeris metzli* a good species and distinguishes it from *A. janus.* [P.B.]

Foltin, Hans, "*Biston (Pœcilopsis) isabellæ* Harr." [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 34: pp. 39-42. 15 March 1949. Distinction from *B. lapponaria;* distribution in Austria. [P.B.]

Forbes, Wm. T. M., "Comments on Dr. Paclt's views." *Ent. News,* vol. 62: p. 307. 1951. Agrees with Dr. Paclt as to the gender of *Colias;* disagrees on *Ochlodes.* [J.T.]

Fox, Richard M., "The taxonomic value of male genitalia in the Ithomiidæ (Lepidoptera)." *Ent. News,* vol. 64: pp. 141-143. 1953. States that in general genitalia are of great value in the family, though not always for species identification. Gives comparative figures and percentages. A valuable study. [P.B.]

Freeman, H. A., "Two new species of *Megathymus* from Texas and Mexico (Lepidoptera, Rhopalocera, Megathymidæ)." *Amer. Mus. Novit.,* no. 1593: 9 pp., 13 figs. 29 Oct. 1952. Describes as new *M. chisosensis* (Chisos Basin, Chisos Mts., Texas; in *Agave chisosensis); M. hoffmanni* (Valle de Mexico). Figures adults and genitalia. [P.B.]

Gaj, Andrew J., "*EUHYPONOMEUTOIDES albithoracellus* gen. nov., spec. nov. (Lepidoptera, Hyponomeutidæ)." *Ent. Berichten,* vol. 15: pp. 11-12, 5 figs. 1 Jan. 1954. Describes *E. albithoracellus* (type of n. genus) from 1 ♂ (Krynica, southern Poland); figures shape of wing, genitalia, adult. [A.D.]

Gray, P. H. H., "Aids to distinguish between females of the "Winter-moths", *Alsophila pometaria* and *Operophtera bruceata* (Geometridæ)." *Lepid. News,* vol. 7: pp. 127-128. 5 Nov. 1953.

Hackman, Walter, "*Clepsis nybomi* nom. nov. für *Tortrix fuliginosana* Hackm." [in German]. *Notul. ent.,* vol. 30: p. 128. Dec. 1950. A new name because of preoccupation (*Clepsis costant* f. *fuliginosana* Schille 1917). [W.H.]

Hartig, Fred, "*Stigmella babylonica* n. sp. von *Salix babylonica* L." [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 94-96, 1 pl. 15 July 1949. New sp. from Klobenstein am Ritten, Bozen; describes all stages, figures ♂ genitalia and leaf-mine. [P.B.]

Hemming, Francis, "Zoological nomenclature." *Science,* vol. 115: p. 684. 20 June 1952. Notice of forthcoming action of Internal Commission on certain works of Cramer, Schiffermüller, and Fabricius, relative to priority of names proposed in them. [P.B.]

Herbulot, C., "Description de quatre Larentiinæ nouveaux du Kenya (Lep. Geometridæ)" [in French]. *Bull. Soc. Ent. France,* vol. 58: pp. 9-12. 1953. Description of four new species of Geometridae from Kenya collected during the Omo mission: *Eupithecia jeanneli, Eulype relicta, Lobidiopteryx elgonica, Asthenitricha strangulata.* [P.V.]

Herbulot, C., "Note synonymique" [in French]. *Bull. Soc. Ent. France,* vol. 58: p. 48. 1953. Synonymy of two names of Geometridæ. *Acidalia couloniata* is a synonym of *Sterrha lævigata.* Lectotype of *A. couloniata* designated [P.V.]

Hoffmann, Emil, "*Parnassius styriacus* Fruhst., eine eigene Art" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 138-148. 15 Dec. 1952. Evidence that *P. styriacus* is a good species rather than a race or form of *P. phœbus.* [P.B.]

Hesselbarth, G., "Bemerkungen zu Pieridenzuchtungen 1950-1951" [in German]. *Trans. 9th Int. Congr. Ent.,* vol. 1: pp. 172-176, 1 fig. March 1953. Breeding and crossing experiments show that *P. napi* and *P. bryoniæ* are distinct species; *P. napi hibernica* is closer to *P. bryoniæ* than to *P. napi;* disposition to producing one or more generations a year is genetically fixed but is easily changed by environmental conditions. [A.D.]

Holik, O., "Ueber die Gattung *Satyrus* L." [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 98-105. 15 July 1949. Describes as new *S. sibyllina pygmæa* (Kansu, Peilingshan, Tauping R.); *S. semele cypriensis* (Cyprus); *S. mniszechii baltistana* (Skardo, Baltistan); also several "varieties" of these and other species of *Satyrus.* Comments on the previously described *S. geyeri occidentalis* [P.B.]

Holik, O., "*Zyg. goberti* Le Charles und *Zyg. anthyllidis* Bsd." [in German]. *Nachrbl. Bayer. Ent.,* vol. 2: p. 47. 15 June 1953. Abstract.

Hovanitz, William, "Natural hybridization in Eurasiatic *Colias hyale* and *Colias croceus.*" *Anat. Rec.,* vol. 117: p. 647. Nov. 1953. Abstract only.

Janmoulle, E., "Remarques sur la faune belge" [in French]. *Lambillionea,* vol. 52: p. 48. 25 Aug. 1952. *Elachista festucicolella,* new to Belgium; previous record a misidentification of *E. nitidulella.* Distinguishes between these two spp. [P.B.]

Jarvis, F. V. L., "The relationship of *Colias croceus* (Fourcroy) and *Colias electo* (Linn.)" *Trans. Roy. Ent. Soc. Lond.,* vol. 104: pp. 521-542, 1 pl., 7 figs. 15 Dec. 1953. Concludes on basis of comparison of structure and behavior that the species are distinct. Figures all stages (in color), genitalia, and androconia of both. [P.B.]

Kaisila, Jouko, "Uber die vermuteten Bastarden zwischen *Colias hecla sulitelma* Aur. und *C. nastes werdandi* Zett. (Lep., Pieridæ)" [in German]. *Ann. Ent. Fennici,* vol. 16: pp. 112-121, 2 figs. Nov. 1950. Gives facts in favour of the assumption that some *Colias* forms from northern Lapland are to be considered as hybrids between *Colias hecla* and *nastes.* [W.H.]

Kauffmann, Guido, "Considérations au sujet de *Pyrgus reverdini* Oberthür" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 284-286. "Oct./Nov./Dec. 1952" [25 March 1953]. Concludes that *B. reverdini* is a variant or, at most, a subspecies of *P. alveus.* [P.B.]

Kiriakoff, S. G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. V. Position systématique de quelques genres des Arctiidæ" [in French]. *Lambillionea,* vol. 50: pp. 62073, 4 figs. 25 Oct. 1950. Proposes RHODOGASTRINÆ n. subfam., for *Rhodogastria, Pelochyta,* and perhaps other genera. Transfers *Belemnia* from Phegopterinæ to Ctenuchinæ. [P.B.]

Kiriakoff, S. G., "À propos de l'article de M. Caruel 'Les nouvelles règles de la nomenclature' " [in French]. *Lambillionea,* vol. 51: pp. 61-62. 25 Oct. 1951. Comments on decision separating specific and infrasubspecific nomenclature; author objects to latter term except as applied to local populations. [P.B.]

Kiriakoff, S. G., "Les organes tympaniques des Lépidoptères et utilisation en systematique" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 173-178, 2 figs. "Jan./Feb." [31 May] 1952. General discussion of structure of tympanic organs and their bearing on the classification of Phalænoidea and Notodontoidea. [P.B.]

Kiriakoff, S. G., "Thyretidæ nouveaux du Congo Belge (Lepidoptera Notodontoidea)" [in French]. *Rev. Zool. Bot. Afric.,* vol. 46: pp. 396-406, 10 figs. 1952. Describes as new, from the Belgian Congo, genus *BERGERIA* (type *B. haematochrysia nov.*), *B. tamsi, B. schoutedeni, B. bourgognei, Apisa dufranei,* and *A. vanoyei.* This material belongs to the "Syntomidæ" *auctt.* [P.V.]

Kiriakoff, S. G., "Arctiidæ nouveaux du Musée Royal du Congo Belge" [in French]. *Lambillionea,* vol. 53: pp. 50-54. 1953. The material described in this paper belongs to the Syntomidæ (family not accepted by the author). Describes as new *Anayisa histrionica* (Angola) and genus *LEPTOCERYX* [type *L. pusilla* (Belgian Congo, Tshuapa, Eala)]. [P.V.]

Kiriakoff, S. G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. X. Hyblæidæ" [in French]. *Bull. Ann. Soc. Ent. Belgique,* vol. 89: pp. 258-263, 1 fig. 1953. The author shows, by the study of the metathorax and the first abdominal segment, that the Hyblæidæ are not a subfamily of the Phalænidæ (=Noctuidæ) or a family of the Pyraloidea, but a good family belonging to a new superfamily HYBLÆOIDEA and near the Phalænoidea (=Noctuoidea). [P.V.]

Klimesch, Josef, "Neue *Stigmella*-Arten (Lep., Stigmellidæ)" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 31: pp. 160-172, 1 pl., 11 figs. 15 Mar. 1948. Describes as new: *S. cerricolella* (Ferrania, Italy; on *Quercus cerris); S. caulescentella* (Trient, Italy, on *Potentilla caulescens); S. pallidiciliella* (Trient, on *Salix purpurea*); *S. phyllotomella* (Ferrania, on *Quercus cerris); S. gilvipenella* (Ferrania, on *Quercus cerris); S. liguricella* (Bordighera, Italy, on *Cistus albidus*). Figures ♂ genitalia, mines, and some adults. [P.B.]

Klimesch, Josef, "*Acampsia scotosiella* Hackman = *A. (Xystophora) latipenella* Rbl. (Lep., Gelechiidæ)" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 33: pp. 23-24, 1 fig. 1 Oct. 1948. Synonymy based on ♂ genitalia. [P.B.]

Klimesch, J., "*Phthorimæa (Lita) saginella* Z. (=*coussonella* Chrét.) (Lep. Gelechiidæ)" [in German]. *Ent. Nachrbl.,* vol. 3: pp. 191-192, 1 pl. Dec. 1951. New synonymy. Describes and figures genitalia, adult, and gall. Foodplant *Silene hayekiana.* [P.B.]

Koch, Manfred, "Ein neuer Weg der Farbbezeichnung in naturwissenschaftlichen Beschreibungen" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 31: pp. 183-187. 15 Mar. 1948. Recommends use of a standard color table in preparing descriptions. [P.B.]

Kurentsov, A. I., "*EOLIMENITIS* (gen. nov.) *eximia* (Molt.) Kurenz. (Nymphalidæ, Lepidoptera) in the fauna of Ussuri territory" [in Russian]. *Bull. Moskov. Obshch. Isp. Prir. Otd. Biol.* (n. s.), vol. 55: pp. 37-45. 1950. [Not seen].

Langston, Robert L., & Owen J. Smith, "Notes on the zygænid genus *Harrisina* Packard, with special reference to *Harrisina metallica* Stretch." *Ent. News,* vol. 64: pp. 253-255. 1953. Rearings indicate that *H. metallica* is a genetic variant of *H. brillians.* The authors suggest that the variations in *H. brillians* may very well cover the characters used to separate most of the south-western species. [J.T.]

de Lattin, Gustaf, "Neue Acronicten II" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 105-112, 3 figs. 15 July 1949. Describes as new *Diphthera fulvicollis* (Sutschanski-Rudnik, Ussuri); genus *CRANIONYCTA* (type *C. oda* n. sp-Sutschanski-Rudnik); also 2 "forms" in *Acronicta.* Figures ♂ genitalia of n. spp. and of *D. alpium murrhina.* [P.B.]

Le Charles, L., "Une zygène nouvelle pour la faune française" [in French]. *Rev. Franç. Lépid.,* vol. 13: p. 219. "March/April" [25 July] 1952. Preliminary description of *Z. goberti* n. sp. (no locality given). Foodplant *Peucedanum cervaria.* [P.B.]

Le Marchand, S., "Le genre *Gelechia* (Gelechiidæ) doit être divisé" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 185-190, 6 figs. "Jan./Feb." [31 May] 1952. Discusses Busck's subdivisions of *Gelechia* and their bearing on the European species; figures ♂ genitalia of some species of *Gelechia* and related genera. [P.B.]

Le Marchand, S., "Tineina - les Elachistidæ" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 167-171. "Jan./Feb." [31 May] 1952. Redescribes and discusses family and genera occurring in France, and gives a key to latter. [P.B.]

Le Marchand, S., "Un peu de grammaire entomolgique et . . . étymologique" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 247-248. "May/June/Sept." [15 Nov.] 1952. Points out that species names formed from foodplant name plus genitive ending *-foliæ* are incorrect, *folium* being neuter. The practice should be discarded in future naming. [P.B.]

de Lesse, H., "Note sur le genre *Kanetisa* (Satyridæ)" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 257-259, 1 pl., 4 figs. "May/June/Sept." [15 Nov.] 1952. Describes and figures close similarity of ♂ genitalia in *K. digna* and *K. stheno,* which are very distinct in pattern; figures adults of these and of *Satyrus parthenica,* which closely resembles *K. digna.* [P.B.]

de Lesse, H., "Révision des *Neohipparchia* d'Afrique du Nord (Lep. Satyridæ)" [in French]. *Bull. Soc. Sci. Nat. Maroc,* vol. 32: pp. 91-105, 16 figs. "1952" [1953]. Revision of the two species of *Neohipparchia* in North Africa, *N. statilinus* and *N. hansii,* with study of every subspecies, ♂ genitalia, and androconial scales. [P.B.]

McDunnough, James H., "Species of *Euxoa* of eastern North America, with particular reference to genitalic characters (Lepidoptera, Phalænidæ)." *Bull. Amer. Mus. Nat. Hist.,* vol. 95: pp. 355-408, 11 figs. 20 Dec. 1950. Describes as new *E. servita novangliæ* (Franconia, N. H.). Redescribes all eastern races, with figures of genitalia of both sexes. Discusses structural details and their taxonomic value. Gives a key to spp. based on ♀ genitalia. [P.B.]

McDunnough, James H., "On the identity of two eastern North American *Hydriomena* species (Lepidoptera, Geometridæ)." *Amer. Mus. Novit.,* no. 1535: 13 pp., 5 figs. 8 Nov. 1951. The true *H. frigidata* is a rare northern species (Nova Scotia) closely allied to *H. divisaria;* the species commonly called *H. frigidata* should be known as *H. manitoba.* Removes *H. transfigurata* from the synonymy of *H. pluviata.* Figures adults and genitalia of these spp. [P.B.]

McDunnough, James H., "On the identity of *Euxoa punctigera* Walker (Lepidoptera, Phalænidæ)." *Amer. Mus. Novit.,* no. 1550: 6 pp., 1 fig. 8 Apr. 1952. Describes and figures genitalia of both sexes. Confirms synonymy of *E. pastoralis,* and considers *E. atrofusca* as synonym or doubtful race; *E. exculta* is a distinct species. [P.B.]

McDunnough, James H., "New species and subspecies in the genus *Hydriomena,* with notes (Lepidoptera, Geometridæ)." *Amer. Mus. Novit.,* no. 1592: 17 pp., 24 figs. 29 Oct. 1952. Describes as new *H. sperryi* (Miami, Ariz.); *H. septemberata* (Julian, San Diego Co., Ariz.); *H. perfracta centralis* (Tesuque, N. Mex.); *H. p. monoensis* (Rock Creek, Mono Co., Calif.); *H. expurgata franclemonti* (Deer Park, Placer Co., Calif.); *H. mississippiensis* (Agric. & Mech. College, Miss.); *H. edenata indistincta* (upper Santa Ana R., San Bernardino Co., Calif.). Figures adults and

genitalia. Places *H. marmorata* as subspecies of *H. perfracta.* Discusses identity of *H. bistriolata* and related species. [P.B.]

Mazokhin-Porzhnyakov, G. A., "A new race of *Satyrus semele* L. (Lepidoptera) from the land along the lower Volga" [in Russian]. *Zool. Zhurn.,* vol. 31: pp. 288-291. 1952. [Not seen.]

Marion, H., "Ebauche d'une classification nouvelle des Pyraustidæ" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 260-270, 5 figs. "May/June/Sept." 15 Nov. 1952. Recognizes the following subfamilies and tribes (new entities in capitals); Schœnobiinæ, Scopariinæ, Nymphulinæ, Pyraustinæ (with HAPALIINI, Pyraustini), EVERGESTINÆ (with EVERGESTINI, TITANII (*sic!*)). Places *Cybalomia* in Scopariinæ. *Mesographe* and *Pionea* are synonyms of *Evergestis.* Key to subfamilies, based on ♂ genitalia. Classification based on study of almost all European species; its extension to other faunas will require additional tribes, at least. [P.B.]

Mather, Bryant, "The names of certain butterflies of the eastern United States." *Lepid. News,* vol. 6: pp. 74-76. 1952.

Michel, Josef, "*Lycæna ismenias* Meigen in Böhmen. Ein Beitrag zur Rassenfrage" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 32: pp. 91-103, 1 pl. 30 June 1948. Statistical analysis of captured and reared series in Bohemia. [P.B.]

Neave, Sheffield Airley, ed., *Nomenclator zoologicus.* vol. 5. 308 pp. Zoological Society of London. 1950. Lists all generic names of animals published from 1936 to 1945 inclusive, and a few omitted from earlier volumes, with citations and phylum, class or order to which assigned. [P.B.]

Obraztsov, Nicholas, "*Thiodia* Hb. as not a North American genus (Lepidoptera, Tortiricidæ)." *Ent. News,* vol. 63: pp. 145-149. 1952. States that *Phaneta* Stephens 1852 is the correct generic name for the North American insects usually placed in *Thiodia.* [J.T.]

Obraztsov, Nikolas, "Neue palæarktische Eucosmini-Arten (Lepidoptera, Tortricidæ)" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 122-129, 5 figs. 15 Nov. 1952. Describes as new *Eucosma (E.) pfisteri* (Tauerbischoffsheim, Baden); *Epibleme (E.) chrétieni* (High Alps); *E. (Notocelia) mediterranea* (Madonie, Silicia); *Epinotia (E.) mesopotamica* (Mesopotamia). Figures ♂ genitalia of n. spp. and of *E. (N.) incarnatana* and *roborana.* [P.B.]

Obraztsov, N., "Zwei neue *Eriopsela*-Arten aus dem Allgäu (Lepidoptera, Tortricidæ)" [in German]. *Nachrbl. Mayer. Ent.,* vol. 1: pp. 93-96, 1 fig. 15 Dec. 1952. Describes as new *E. roseni* and *E. bavarica;* figures ♂ genitalia of 3 spp., key to Palaearctic spp. of the genus. [N.O.]

Obraztsov, N., "*Epiblema scutulana* (Schiff.) (Lepidoptera, Tortricidæ)" [in German]. *Tijidschr. voor Ent.,* vol. 95: pp. 323-330, 4 figs. 20 Dec. 1952. Discusses taxonomy and synonymy. [A.D.]

Orfila, Ricardo N., "Las especies argentinas de *Prepona* Boisd. (Lep. Nymph.)" [in Spanish]. *Rev. Inst. Nac. Invest. Cien. Nat. B. Aires, Cien. Zool.,* vol. 1: pp. 273-321, 1 pl., 16 figs., 6 maps. 1950. Describes as new *P. chromus obsoleta* (Tucumán). Redescribes genus and subgenera *Archæoprepona* and *Prepona* in great detail; redescribes Argentinian spp., figuring range and ♂ genitalia. [P.B.]

Owen, D. F., "An unusual pairing." *Entomologist,* vol. 85: p. 96. Apr. 1952. *Hepialus lupulinus* ♂ with *H. fusconebulosus* ♀. [P.B.]

Riley, N. D., "A polymorphic *Charaxes, Charaxes etheocles* Hewitson." *Nigerian Field,* vol. 16: pp. 67-69, 10 figs. April 1951. The species or species group includes 7 named forms in West Africa (all figured); their status is uncertain. [P.B.]

Rindge, Frederick H., "A revision of the geometrid genus *Sericosema* (Lepidoptera)." *Amer. Mus. Novit.,* no. 1468: 30 pp., 7 figs. 18 Oct. 1950. Describes as new *S. wilsonensis macdunnoughi* (Seton Lake, Lillooet, B. C.). Places *S. argentata* as subspecies of *S. immaculata,* and *S. meadowsaria* as subspecies of *S. wilsonensis.* Redescribes genus and the 4 known species. Gives distribution map for each species. Gives keys, based on adults and on genitalia of each sex. [P.B.]

Rindge, Frederick H., "Taxonomic and life history notes on North American *Eupithecia* (Lepidoptera, Geometridæ)." *Amer. Mus. Novit.,* no. 1569: 27 pp., 8 figs. 6 June 1952. Proposes *E. macdunnoughi* n.n. for *E. suspiciosata* McD. (not Dietze). Redescribes *E. suspiciosata.* Synonymizes *E. implicata* under *E. castigata,* and *E. geminata* under *E. coagulata; E. coagulata* auctt. must be known as *E. fumosa.* Redescribes *E. johnstoni.* Transfers *E. emmedonia* to *Prorella.* Suggests that *P. mellissa* and *P. insipidata* may be conspecific. Describes pupal structure of 25 spp., figuring posterior end and cremaster; records foodplants. [P.B.]

Rindge, Frederick H., "A revision of the geometrid genus *Exelis* (Lepidoptera)." *Amer. Mus. Novit.,* no. 1382: 17 pp., 7 figs. 1 Aug. 1952. Describes as new *E. dicolus* (Sulphur City, Washington Co., Ark.); *E. ophiurus* (Burnet Co., Tex.); restricts genus to these two spp. and the type, *E. pyrolaria* (other species belong in *Tornos).* Figures genitalia. Distribution maps and keys to species based on adults and on genitalia of each sex. [P.B.]

Rindge, Frederick H., "A revision of the North American species of the genus *Syrrhodia* (Lepidoptera, Geometridæ)." *Amer. Mus. Novit.,* no. 1469: 26 pp., 6 figs. 20 Oct. 1952. Synonymizes *Catopyrrha* under *Syrrhodia.* Genus includes the *S. decrepitaria* (with ssp. *esperanza), S. viridirufaria, S. cruentaria, S. sphaeromacaria.* Redescribes genus and spp.; figures genitalia and distribution of each species. Gives keys, based on adults and genitalia of each sex. [P.B.]

Rindge, Frederick H., & Claude I. Smith, "A revision of the genus *Annaphila* Grote (Lepidoptera, Phalaenidae)." *Bull. Amer. Mus. Nat. Hist.,* vol. 98: pp. 187-256, 8 figs. 30 Jan. 1952. Describes as new: subgenus *PROANNAPHILA* (type *A. danistica); A. (P.) hennei* (Bob's Gap, south of Llano, Los Angeles Co., Calif.); *A. (P.) mera eremia* (same locality); *A. (A.) abdita* (Pinnacles, San Benito Co., Calif.); *A. (A.) baueri* (Anderson Springs, Lake Co., Calif.); *A. (A.) ida* (Newcomb's Ranch, north of Chilao, San Gabriel Mts., Los Angeles Co., Calif.); *A. (A.) depicta morula* (La Tuna Canyon, Los Angeles Co., Calif.); *A. (A.) spila* (Bridgeman, Madeira Co., Calif.); *A. (A.) evansi* (Mint Canyon, Los Angeles Co., Calif.). Redescribes all spp., figuring genitalia. [See review in *Lepid. News,* vol. 6: p. 111.] [P.B.]

Roepke, W., "The *katinka* group of the genus *Lœpa* (Lepidoptera Heterocera, Saturniidæ)." *Ttjidschr. Ent.* vol. 96: pp. 227-230, 1 pl., 2 figs. 21 Nov. 1953. Gives a survey of the south-Asiatic subspecies of this group (except for China and Formosa), with figures of six of them, and with figures of the male genitalia of *L. javanica* and *L. megacore.* [A.D.]

Shoumatoff, Nicholas, "Some statistical concepts in taxonomy." *Lepid. News,* vol. 6: pp. 64-66. 1952.

van Someren, V. G. L., & T. H. E. Jackson, "The *Charaxes etheocles-ethalion* complex: a tentative reclassification of the group (Lepidoptera: Nymphalidæ)." *Trans. Roy. Ent. Soc. London,* vol. 103: pp. 257-284. 15 Nov. 1952. Redescription of 9 spp. and numerous subspecies and "forms". Describes as new *C. pembanus usambaræ* (Usambara); also several "forms". Notes on life history, mimicry, and distribution. [P.B.]

de la Torre y Callejas, Salvador Luis, "Datos taxonomicos sobre lepidopteros, con notas sobre algunas especies cubanas. (Segunda Parte)" [in Spanish]. *Mem. Soc. Cubana Hist. Nat. "Felipe Poey",* vol. 21: pp. 61-70. 28 Apr. 1952. Taxonomic notes on 16 genera and spp. (Nymphalidæ, Pieridæ, Hesperiidæ). [P.B.]

Tams, W. H. T., "A revision of the African species of *Sesamia* Guenée and related genera (Agrotidæ-Lepidoptera)." *Bull. Ent. Res.,* vol. 43: pp. 645-678, 7 pls. Jan. 1953. Describes as new: *SPEIA* (type *Phalæna vuteria* Stoll); *SCIOMESA* (type *Conicofrontia mesoscia* Hampson); *PŒONOMA* (type *Phragmatiphila serrata* Hampson); *P. similis* (Ibadan, S. Nigeria); *P. acantha* (Dungu, Upper Uelle District, Cameroons); *S. botanephaga* (Ilesha, S. Nigeria); *S. jansei* (Preoria; Natal, Durban); *S. poephaga* (Ketekrachi, N. Territories, Gold Coast); *S. penniseti* (Owabi, Ashanti, Gold Coast); *S. poebora* (Kawanda, Uganda); *S. albivena sudanensis* (Temboura, Sudan); *S. a. mocoënsis* (Mt. Moco, Luimbale, Portuguese E. Africa); *S. oriaula* (Bwamba Pass, Ruwenzori Range, Uganda). Redescribes all African spp. of *Sesamia* (except 5 not seen or identified); lists foodplants, when known, and gives distribution. Figures genitalia and other structures of new spp. and some others. Corrects earlier confusion in application of some names. Keys to genera (those listed above, and *Conicofrontia* and *Busseola)* and their spp. [P.B.]

Travassos, Lauro, "Contribução ao conhecimento dos "Arctiidæ". XXV. Sôbre o gênero *ARCTIARPIA* n. g." [in Portuguese]. *Rev. Brasil. Biol.,* vol. 11: pp. 249-253, 10 figs. Sept. 1951. New genus erected for *Idalus melanopasta* Hampson; figures adults and genitalia of both sexes. [P.B.]

Travassos, Lauro, "Contribução ao conhecimento dos "Arctiidæ". XXVI. Sôbre o gênero *XANTHOARCTIA* n. g." [in Portuguese]. *Rev. Brasil. Biol.,* vol. 11: pp. 393-398, 19 figs Dec. 1951. New genus erected for *Automolis pseudameoides* Rothschild; redescribes species, with numerous illustrations. [P.B.]

Viette, P., "Contribution à l'étude des Hepialidæ (17e note). Les genres et leur espèce type" [in French]. *Lambillionea,* vol. 50: pp. 73-80. 25 Oct. 1950. Errata, *ibid.* vol. 52: p. 30. 25 June 1952. Lists the 48 genera recognized as valid, with citations, synonyms, and type species; notes on some doubtful questions of synonymy. [P.B.]

Viette, P., "Les microlépidoptères de C. Dumont" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 56-59, 4 figs. "Mar-Apr." [31 July] 1951. Describes as new *PHOSPHATICOLA, P. gemmatella* (Metliaoui, Tunis) (Schrecksteiniidæ); from Dumont MS. Selects types for 20 spp. described by Dumont (Pyralididæ, Tortricidæ, Gelechiidæ, Ochsenheimeriidæ); types in Paris Museum, from Dumont's series. Lists allotypes, when possible, and localities of holotypes. [P.B.]

Viette, Pierre E. L., "Contribution à l'étude des Cossidæ (2e note). Les genres et leur espèce type" [in French]. *Lambillionea,* vol. 51: pp. 37-43, 58-60, 68-72. 25 Aug., 25 Oct., 25 Dec. 1951. Proposes *ALLOCRYPTOBIA* n.n. for *Cryptobia* (preoccupied). Lists the 97 genera recognized as valid, with citations, some synonyms, and type species. [P.B.]

Voss, Edward G., "On the classification of the Hesperiidæ." *Ann. Ent. Soc. Amer.,* vol. 45: pp. 246-258, 25 figs. June 1952. Revised classification, based on bleached and mounted wings, antennæ, palpi, and legs of 54 spp., and more superficial study of others. Places all Skippers in one family, with following subfamilies and tribes: Euschemoninæ, Cœliadinæ, Pyrginæ, Pyrrhopyginæ, Megathyminæ, Trapezitinæ (Trapezitidi, Hesperillidi), Hesperiinæ (Heteropteridi, Taractroceridi, Hesperiidi, Calpodidi). Gives a tentative phylogenetic chart. [P.B.]

Warnecke, Georg, "Die Alpenrasse von *Orodemnias quenselii* Payk., nov. subsp. *alpivolans* Warn." [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 127-129. 15 Sept. 1949. Points out that typical race is northern, not alpine as previously assumed, and names alpine race (type locality Grossglockner, Carinthia). [P.B.]

Warren, B. C. S., "Speciation in the genus *Colias*: with special reference to *C. hyale* and *C. australis*" [in English, French summary]. *Lambillionea,* vol. 50:pp. 90-98, 2 pls. 25 Dec. 1950. Discusses difficulties in using ♂ genitalia to characterize spp. of *Colias.* Describes the valid but inconspicuous differences in genitalia between *C. hyale, C. australis,* and some other spp. Figures ♂ genitalia of *C. croceus, C. palæno europomene, C. phicomone, C. australis calida,* and *C. hyale.* [P.B.]

Warren, B. C. S., "On *Pyrgus freija* (Warren) (Lep. Hesperiidæ)." *Entomologist,* vol 84: pp. 217-220, 1 pl. Oct. 1951. Distinction from *P. centaureæ.* [P.B.]

Zopp, J., "*Pholus hornbeckiana* Harris = *Pholus vitis* Linné (nec Drury)" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 129-130. 15 Nov. 1952. Points out that *P. hornbeckiana* is a synonym of the true *P. vitis,* and *P. vitis* Drury is a synonym of *P. fasciatus;* notes distinctive pattern features. [P.B.]

C. MORPHOLOGY AND CYTOLOGY

Dupuis, C., "Données sur la morphogénèse des genitalia mâles des insectes. Leur importance pour une nomenclature rationelle de ces structures" [in French]. *Trans. 9th Int. Congr. Ent.,* vol.1: pp.151-154. March 1953. Reviews his previous study where he proposed to divide male genital organs, judging from their morphogeny, in euphallic and pseudophallic organs. The appendicular origin of these organs allows conclusions as to their being homologous in different groups, and thus enables to simplify and correct the existing multitude of genital terms (*e. g.,* parameres for harpagones, claspers, valvæ, harpes etc.). [A. D.]

Eassa, Y. E. E., "The development of imaginal buds in the head of *Pieris brassicæ* Linn. (Lepidoptera)." *Trans. Roy. Ent. Soc. London,* vol. 104: pp. 39-50, 1 pl., 3 figs. 15 Apr. 1953. Adult head appendages develop near larval ones, from first instar on, growing continuously (larval appendages grow only at molt). [P.B.]

Federley, Harry, "Meiosis and intersexuality in reciprocal *Drepana* hybrids (Lep.)" *Hereditas,* vol. 35: pp. 49-66, 12 figs. 12 Jan. 1949. Reports incomplete pairing of chromosomes in F^1, and transformation of ovaries to testes as in *Lymantria* intersexes. [P.B.]

Hausman, Sibyl A., "The scent-producing organ of the male Monarch Butterfly." *Amer. Nat.* vol.85: pp.389-391, 1 fig. Nov.-Dec. 1951.

Hinton, H. E., "The structure of the larval prolegs of the Lepidoptera and their value in the classification of the major groups." *Lepid. News,* vol. 6: pp. 1-6, 4 figs. 8 Aug. 1952.

D. VARIATION AND GENETICS

Astaurov, B. L., "Triploid artificial parthenogenesis in Mulberry Silkworm" [in Russian]. *Dokl. Akad. Nauk SSSR.,* vol. 61: pp. 411-414. 11 July 1948. [Not seen.]

Hovanitz, William, "Increased variability in populations following natural hybridization." *In* Jepsen, G. L., *et al., Genetics, Paleontology, and Evolution,* pp. 339-355, 1 pl., 5 maps. Princeton Univ. Press. 1949. Summary of information on presumed cases of hybridization between North American species of *Colias* and *Basilarchia.* [P.B.]

Kautz, Hans, "Die gelben Formen von *Pieris napi* L." [in German]. *Zeits. Wiener Ent. Ges.,* vol. 35: pp. 42-50. 1 June 1950. Redescribes the named yellow forms of *P. napi* and discusses their distribution and nomenclature. [P.B.]

Kautz, Hans, "*Pieris napi* L. und *bryoniæ* O., neue confluens-Formen" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 38: pp. 25-27. 1 March 1953. Names an aberration and records several other variants. [P.B.]

Komai, Taku, "Composition of wild populations in the lycænid butterfly *Neozephyrus taxila.*" *Amer. Nat.,* vol. 87: pp. 87-95, 2 figs. Mar./Apr. 1953. Analysis of frequency of the 4 pattern types of the polymorphic female in some wild populations, as evidence for the genetic basis of the polymorphism. [P.B.]

Le Gare, Mary Jude (Sister) & William Hovanitz, "Genetic and ecological analyses of wild populations in Lepidoptera. II. Color pattern variation in *Melitæa chalcedona.*" *Wasmann Journ. Biol.,* vol. 9: pp. 257-310. 1951. Very extensive analysis of wing patterns. The authors conclude, among other things, that the changes in color are greatest where the climatic change is greatest. Papers of this type stimulate thought, but are quite sure to divide readers into two camps: adherents and detractors. [J.T.]

Lever, R. J. A. W., "Faunal speciation in New Georgia, Solomon Islands." *Pacific Sci.,* vol. 7: pp. 250-251, 1 fig. Apr. 1953. Includes note on pattern variation in *Troides victoriæ rubianus.* [P.B.]

E. DISTRIBUTION AND PHENOLOGY

Beebe, Ralph, "Sampling Michigan Lepidoptera by the fixed light trap." *Lepid. News,* vol. 7: p. 28. 20 Apr. 1953.

Bourgogne, J., "*Melitæa athalia athalia* Rott. et *M. athalia helvetica* Ruhl *(pseudathalia* Rev.) en France. Étude biogéographique (Lep. Nymphalidæ)" [in French]. *Ann. Soc. Ent. France,* vol. 122: pp. 131-176, 35 figs. "1953" [1954]. Morphological, biometrical, and biogeographical study of the repartition in France of *M. a. athalia* and *M. a. helvetica.* [P.V.]

Brown, F. Martin, "*Œneis oslari* Skinner, rediscovered (Lepid., Nymphalidæ [*sic!*])." *Ent. News,* vol. 63: pp. 119-123. 1952. Includes a discussion of terrain and flight habits. [J.T.]

Hovanitz, William, "The biology of the *Colias* butterflies. III. Variation of adult flight in the arctic and subartic." *Wasmann Journ. Biol.,* vol. 9: pp. 1-10. 1951. A study of the seasonal appearance of the various arctic and subarctic spp. of *Colias.* Indicates how phenology may be an isolating mechanism. [J.T.]

Kiriakoff, S., & H. Stempffer, "Un difficile problème de repartition géographique" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 229-235. "May/June/Sept." [15 Nov.] 1952. Explains disjunct distribution of the 4 spp. of Brephidiinae (2 *Brephidium* in the New World, 1 *Brephidium* and *Oraidium barberæ* in South Africa) on the basis of Wegener's theory of continental drift; other possible explanations are considered. [P.B.]

Lambremont, Edward Nelson, "The butterflies and skippers of Louisiana (Abs.)" *Tulane Univ. Abs. Diss. Theses,* 1951: p. 84.

de Lesse, H., & P. Viette, "Quelques Lépidoptères de Besse-en-Chandesse (P.-de-D.)" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 78-83, 1 fig. "May/June" [10 Aug.] 1951. Annotated list of some 125 micros.

Lewis, C. B., "Butterfly notes." [Title varies.] *Nat. Hist. Notes Nat. Hist. Soc. Jamaica,* no. 29/30: p. 91; no. 31: p. 111; no. 33: p. 157; nos. 35/36: p. 204; no. 37: p. 13; no. 49: p. 8. 1947-1951. Notes on some Jamaican rarities, including *Papilio sinon,* P. *homerus, Eurema gundlachia, Brephidium isophthalma, Hymenitis diaphane,* etc. [P.B.]

Lewis, C. B., "The unpredictable butterfly - *Papilio sinon.*" *Nat. Hist. Notes Nat. Hist. Soc. Jamaica,* vol. 6: p. 28. Sept./Nov. 1953. Flight period.

F. BIOLOGY AND IMMATURE STAGES

Acree, Fred, Jr., "The isolation of gyptol, the sex attractant of the female Gypsy Moth." *Journ. Econ. Ent.,* vol. 46: pp. 313-315. Apr. 1953. Chemical properties.

Anonymous, "Two citrus orchard butterflies (Papilionidæ)." *Agric. Gaz. N. S. Wales,* vol. 61: pp. 87-89, 5 figs. 1 Feb. 1950. Reprinted in vol. 63: pp. 190-192. 1 Apr. 1952. Life history of *Papilio ægeus* and *P. anætus;* figures adults and early stages. [P.B.]

Anonymous, "The Army Worm *(Cirphis unipuncta).*" *Agric. Gaz. N. S. Wales,* vol. 62: pp. 362-363, 3 figs. 2 July 1951. Biology and control.

Beebe, William F., "A contribution to the life history of *Colobura (Gynæcia* auct.) *dirce dirce* (Linnaeus). (Butterfly)." *Zoologica, N. Y.,* vol. 37: pp. 199-202, 2 pls. 31 Dec. 1952. Describes and figures larva; on *Cecropia peltata.* Young larva constructs a column of excrement pellets and rests on it when not feeding. [P.B.]

Beebe, William, "A contribution to the life history of the euchromid moth, *Æthria canicauda* Butler." *Zoologica, N. Y.*, vol. 38: pp. 155-162, 2 pls. 25 Nov. 1953. Describes larva and pupation. Larva fixes long body hairs in whorls around twig and pupates between whorls in hammock made in part of short body hairs. Foodplant *Scleria melaleuca.* [P.B.]

Diakonoff, A., "Viviparity in Lepidoptera." *Trans. 9th Int. Ent. Congr.,* vol. 1: pp. 91-96, 2 figs. March 1953. Supposes that there are different kinds of viviparity: incidental and natural. The latter kind is detected in *Monopis* spp. (Tineidæ) from the Papuan region. Study of dried material showed presence of a uterus: extremely dilated portion of oviduct, crammed with hatched larvæ. Surmises that these species are parthenogenetic and that eggs develop inside uterus even before emergence of the mother insect from the pupa. Figures anatomy of female reproductive system. [A.D.]

Dickson, C. G. C., "The life history of *Phasis zeuxo zeuxo* (L.) (Lepidoptera: Lycænidæ)." *Trans. Roy. Soc. S. Afr.,* vol. 33: pp. 447-456, 1 pl., 4 figs. Aug. 1952. Describes all stages and instars; foodplant *Chrysanthemoides incana.* Notes on distribution. [P.B.]

de Lesse, H., "Observations sur la ponte de quelques *Erebia*" [in French]. *Lambillionea,* vol. 53: pp. 45-48. 1953. Notes on the egglaying of some *Erebia*: *E. t. tyndarus, E. hispania rondoui, E. cassioides carmenta, E. p. pandrose, E. p. sthennyo,* and *E. scipio.* [P.V.]

Liebaldt, Ernst, "Beobachtungen an der Gespinstmotte *Hyponomeuta evonymella* L." [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 89-94. 15 July 1949. In communal nests of this moth on *Prunus padus,* a few larvæ are always found which do not pupate with the others but continue spinning and repairing the nest, and eventually die. The difference in behavior does not seem to be correlated with the marked difference in size and color observed in larvæ. [P.B.]

Marten, Werner, "Weitere Bemerkungen über *Graëllsia isabellæ* Gr." [in German]. *Ent. Nachrbl.,* vol. 4: pp. 57-59. Apr./Dec. 1952. Flight period in early evening; flight strong. [P.B.]

Massee, A. M., "Notes on some interesting insects observed in 1947." *Ann. Rept. E. Malling Res. Sta., 1947*: pp. 135-140, 1 pl. Oct. 1948. Reports *Mamestra trifolii* feeding on apples; biological notes on some other pest species. [P.B.]

Novicky, S., "Der amerikanische Webspinner (*Hyphantria textor* Harr.). Ein für Europa neuer Grossschädling nunmehr auch in Oesterreich" [in German]. *Ent. Nachrbl.*, vol. 3: pp. 166-170. Oct./Nov. 1951. Biology, parasites, spread in Europe. Considers introduced species to be *H. textor,* not *H. cunea* as previously reported. [P.B.]

Panton, E. S., "The life history of a butterfly - *Aganisthos odius orion.*" *Nat. Hist. Notes Nat. Hist. Soc. Jamaica,* vol. 5: pp. 190-191, 4 figs. Mar. 1953. Foodplant *Cecropia peltata;* describes all stages and habits. [P.B.]

Roth, Louis M., & Edwin R. Willis, "Observations on the behavior of the Webbing Clothes Moth." *Journ. Econ. Ent.,* vol. 45: pp. 20-25, 1 fig. Feb. 1952. Reports sex attractant secreted by ♀ *Tineola bisselliella.* [P.B.]

Sarlet, L., "Iconographie des oeufs de Lépidoptères (Faune de la Belgique) (suite)" [in French]. *Lambillionea,* vol. 53: pp. 26-32. 1953. Eggs of *Papilio podalirius* and *P. machaon,* with some bibliographical references. [P.V.]

Sarlet, L., "Iconographie des oeufs de Lépidoptères (Faune de la Belgique)" [in French]. *Lambillionea,* vol. 53: pp. 54-63. 1953. Bibliography on the eggs of the Pieridæ of the Belgian fauna. It is a pity that the author treats a fauna of which the area is biologically so artificial. [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Chefurka, William, & Carroll M. Williams, "Biochemical changes accompanying the metamorphosis of the blood of the Cecropia Silkworm." *Anat. Rec.,* vol. 111: pp. 516-517. Nov. 1951. Abstract only.

Chefurka, William, & Carroll M. Williams, "Flavoproteins in relation to diapause and development in the Cecropia Silkworm." *Anat. Rec.,* vol. 113: p. 562. Aug. 1952. Abstract only.

Doull, K. M., "Phase coloration in lepidopterous larvæ." *Nature,* vol. 172: pp. 813-814. 31 Oct. 1953. Reports dark coloration of larvæ of *Persectania ewingi* in mass outbreaks and when reared on an artificial food lacking pigments. [P.B.]

Harvey, William R., & Carroll M. Williams, "Changes in the cyanide sensitivity of the heart-beat of the Cecropia Silkworm during the course of metamorphosis." *Anat. Rec.,* vol. 117: p. 544. Nov. 1953. Abstract only.

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I. TECHNIQUE

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Holst Christensen, P., "The development in vivo of time-fixed eggs of *Cochlidion limacodes* Hufn. (fam. Cochlidiidæ, Lepidoptera)." *Trans. 9th Int. Congr. Ent.,* vol. 1: pp. 219-222. March 1953. Describes a method of studying the development of living lepidopterous eggs: they must be flat, transparent and deposited on glass or cellophane; describes development of the eggs of *C. limacodes.* [A.D.]

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J. MISCELLANY

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NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or to reject unsuitable notices. We cannot guarantee any notices but expect all to be *bona fide.*

For exchange or sale: SERIES OF *PARNASSIUS* from each catching place, with precise data, including altitude and time caught. Write offers to Curt Eisner, 5 Kwekerijweg, The Hague, NETHERLANDS.

For sale at prices well below usual dealers' lists: Seitz, Rhopalocera vols. IX (Indo-Australia) and XIII (Africa); Leech, oriental butterflies, 3 vols.; de Niceville, Lycaenidae of India, etc.; Peile, butterflies of India; Kirby, catalogue, 1871; Bethune-Baker, *Amblypodia* group, 1903; Hewitson, *Illustrations,* Lycaenidae; Lang, *Butterflies of Europe,* part. Please write for details. E. L. Todd, Division of Insects, U. S. National Museum, Washington 25, D.C., U. S. A.

Wish to sell lot of 200 Lepidoptera, mostly Rhopalocera, from France, Switzerland, and Spain, left by deceased friend. Priced at $10.00, cost to me. Alex K. Wyatt, 5842 N. Kirby Ave., Chicago 30, Ill., U. S. A.

Will contract to collect insects, of all orders, in So. Calif. and Arizona. Charles Hill, 1350 San Luis Rey Drive, Glendale 8, Calif., U. S. A.

Seitz Macrolepidoptera Volume 9, Indo-Australian Phopalocera, $90.00. Text partially bound; plates complete, unbound. Write for particulars. Thomas W. Davies, 791 Elsie Ave., San Leandro, California, U. S. A.

Œneis stanislaus, Gyrocheilus tritonia, Speyeria myrtleæ, Speyeria clemencei offered in exchange for North American species needed for my collection. Please send offerta lists. T.W. Davies, 791 Elsie Ave., San Leandro, California, U. S. A.

Wish to buy large quantities of colorful butterflies from all parts of the world, for artistic displays. Gordon R. Steinhoff, 3916 Oak St., Burbank, Calif., U. S. A.

Wanted: *Troides* (=*Ornithoptera*) of all kinds, *Papilio antimachus,* and other *Papilio* from Africa, India, and Indoaustralia; please send list and prices. All kinds of Illinois butterflies for exchange. Karl E. Karalus, 10411 Diversey, Melrose Park, Ill., U. S. A.

Anyone interested in joining a field trip to Central America please write for details. Also offer to sell a part of my expected catch, in large quantities, to help defray expenses; arrangements should be made beforehand. E.C. Welling, 700 E. 240 St., Euclid 23, Ohio, U. S. A.

LIVING MATERIAL

LIVING PUPAE OF *PAPILIO RUTULUS, MULTICAUDATUS, EURYMEDON* urgently needed for research purposes; will purchase or exchange. Lincoln P. Brower, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

California moths and butterflies for sale, papered, pinned to suit. Many pupæ available. Inquiry invited. F.P. Sala, 1912 Hilton Drive, Burbank, California, U.S.A.

Wanted: pupæ (in diapause) of any of the North American subspecies of *Pieris napi, P. bryoniæ, P. virginiensis.* Available: pupæ of European *Pieris* subspecies and of certain hybrids. Sydney R. Bowden, 33 South View, Letchworth, Herts., ENGLAND.

NOMINATIONS FOR 1955 OFFICERS OF THE LEPIDOPTERISTS' SOCIETY

The Nominating Committee (E. P. MEINERS, A. H. CLARK, and E. G. MUNROE, Chairman) has presented the following list of nominees for 1955 officers:

President — LAURO TRAVASSOS (Senior), BRASIL

1st Vice President — JOHN A. COMSTOCK, U. S. A.

Vice Presidents — A. BREYER, ARGENTINA, and P. E. L. VIETTE, FRANCE

Secretary — JOHN G. FRANCLEMONT, U. S. A.

Treasurer — SIDNEY A. HESSEL, U. S. A.

Executive Council (to complete term of J. L. SPERRY, deceased) — A. E. BROWER, U. S. A.

Executive Council (new 3 year terms) — E. B. FORD, UNITED KINGDOM, and N. S. OBRAZTSOV, U. S. A.

Ballots will be distributed by the Secretary to all Society members in good standing, in the fall.

President DIAKONOFF has appointed Dr. BROWER to the Executive Council in Mr. SPERRY'S place for the remainder of 1954. The Executive Council has fixed the place for the 1954 annual meeting as Pittsburgh (Carnegie Museum) and the time as December. It has also reappointed Dr. REMINGTON Editor-in-Chief and Librarian, and it has approved the establishment of a western North American section of the Society for the purpose of holding annual meetings.

ADDITIONS TO THE MEMBERSHIP LIST

Coutsis, John G., Yale Station, New Haven 11, Conn., U.S.A.
Dillon, Tom, 28 Centre St., Elmira, Ont., CANADA.
DOYLE, L. F. BOKER, Duck Pond Road, Glen Cove, Long Island, N. Y., U.S.A.
Gunn, George, Box 197, Channelview, Texas, U.S.A.
Miller, Dale DeVern, 650 Almyra Ave., Youngstown 11, Ohio, U.S.A.
Sollaart, A., Medang Ara Estate, Kwala Simpang, Sumatra Timur, INDONESIA.
Steinhoff, Gordon R., 3916 Oak St., Burbank, Calif., U.S.A.

The designs of *Heliconius* on the cover, *Morpho* pupa (p.66), and sphingid larva (p.93) are by JOHN G. COUTSIS.

THE LEPIDOPTERISTS' SOCIETY

1954 OFFICERS

President:	A. DIAKONOFF (Leiden, Netherlands)
1st Vice President:	FRANK M. JONES (Wilmington, Del., U. S. A.)
Vice President:	N. D. RILEY (London, United Kingdom)
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Secretary:	FREDERICK H. RINDGE (New York, U. S. A.)
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EXECUTIVE COUNCIL

Term expires Dec. 1954:	WALTER HACKMAN (Helsingfors, Finland) ROGER VERITY (Caldine, Italy)
Term expires Dec. 1955:	JOSE HERRERA G. (Santiago, Chile) A. E. BROWER (Augusta, Maine, U. S. A.)
Term expires Dec. 1956:	JEAN BOURGOGNE (Paris, France) DON B. STALLINGS (Caldwell, Kansas, U. S. A.)

and *ex-officio:* the above officers and the Editor-in-Chief

The object of The Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

Active Members - annual dues $3.00 (U. S. A.)
Sustaining Members - annual dues $5.00 (U. S. A.)
Life Members - single sum $50.00 (U. S. A.).

Each year a list of members of the Society is published in the *News,* with addresses and special interests.

All members are expected to vote for officers when mail ballots are distributed by the Secretary each year.

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In This Issue

A NEW REARING DEVICE

HEREDITY OF SPOT ABERRATIONS IN *LYCÆNA*

HILLTOPPING BUTTERFLIES IN FRANCE AND GEORGIA

1954 ANNUAL MEETING IN PITTSBURGH
December 28-30 (see p. 140)

(Complete contents on back cover)

20 October 1954

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.*, wing venation, mimicry, moth traps); 2) papers on pre-adult stages, genetics, comparative taxonomy (descriptions of new species and subspecies will be accepted); 3) field notes of more than a very local nature; 4) notes on well-tested techniques. Papers of more than ten pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

Legends of figures and tables should be written on separate sheets. Half-tones and tables must be kept within economical limits, and authors are normally charged for the cost of engravings and tables.

Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; Latin names of genera and species will be italicized, and authors of such Latin names WILL NOT APPEAR IN THE TITLE of any paper but must appear once in the text. THE STYLE SHOULD CONFORM TO THAT USED IN RECENT ISSUES OF THE *NEWS*. Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

At least 25 gratis reprints will be provided to authors if requested at the time galley proof is received for correction. Additional reprints and covers may be ordered at cost, at the same time.

Address editorial correspondence to: Dr. C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U. S. A.

Address Society correspondence to: Dr. F. H. RINDGE, Dept. of Insects & Spiders, American Museum of Natural History, New York 24, N.Y., U. S. A.

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THE LEPIDOPTERISTS' NEWS

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THE TURGORATOR, A NEW DEVICE FOR REARING INSECTS

by GEORGE F. PRONIN

The Turgorator is used to stimulate artificially turgor in any part of a plant separated from a growing plant. For an example, a branch cut from a tree, subjected to the Turgorator treatment and placed in water, will retain its life and natural moisture for several days, even if the temperature of the surrounding atmosphere is maintained constantly as high as 45° C.

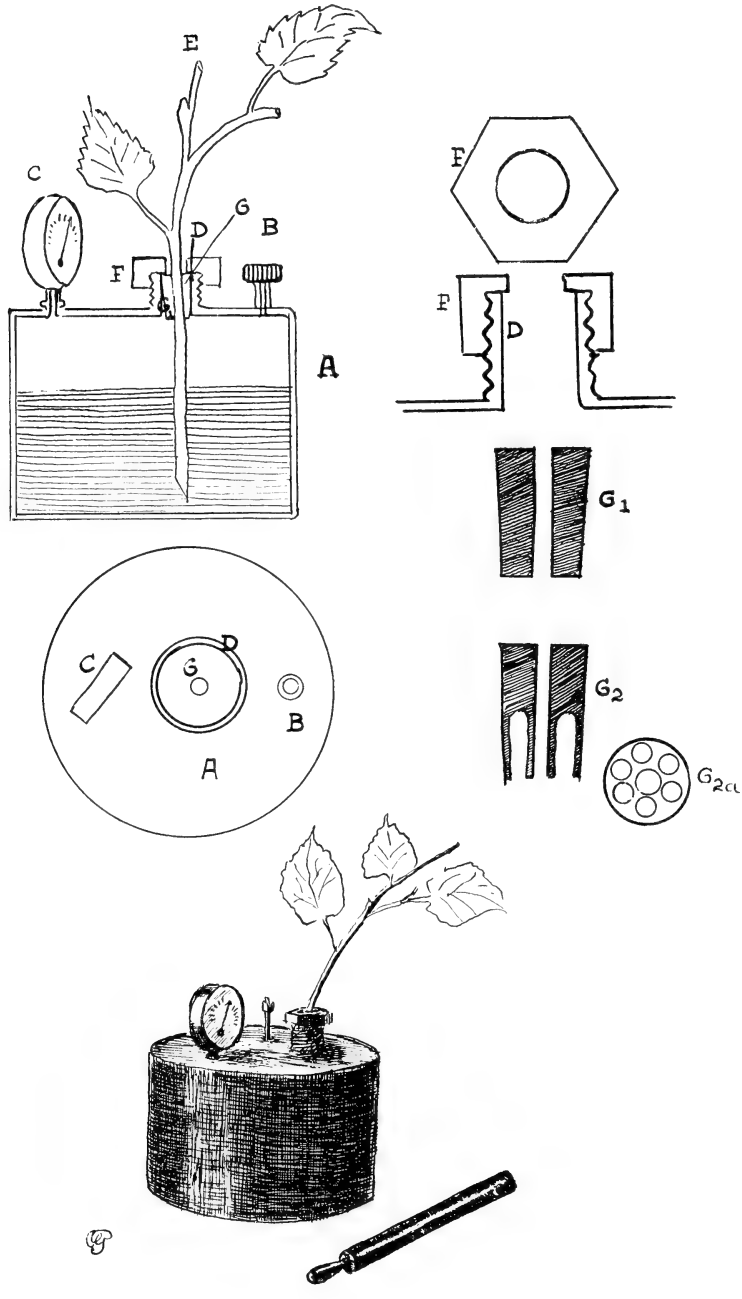
The instrument, as illustrated in the attached drawings, consists of a tank (A) capable of withstanding air pressure up to 4.5 atmospheres. The size and shape of the tank may vary. The tank is supplied with not less than three openings:

Opening (B) contains a self closing air induction valve;
Opening (C) is supplied with air pressure gauge, manometer;
Opening (D), supplied with a threaded neck, is used for filling the tank with liquid, emptying the tank, and placing into the liquid in the tank a branch of a plant in the following manner.

The stem of a branch cut from a growing plant is put through threaded nut (F) and through vertical hole of rubber cork (G or G_2). The branch is then placed in the tank through the threaded neck (D), the rubber cork is fitted in the opening, and the nut is screwed on the neck pressing the rubber cork down and around the stem until the tank is made air-tight. After that, air is pumped into the tank to establish the desired pressure (the "air cushion") which is controlled by the manometer.

The possibilities offered by the use of the Turgorator are innumerable; a few of them are as follows:

RAISING SILK WORMS. The Turgorator makes it possible to use whole branches covered with live leaves for the purpose of feeding the silk worms instead of using the leaves alone, which quickly wilt, dry up, and must be frequently replaced. The leaves on the Turgorator-treated branches placed in the hatchery are devoured by the larvæ before the stimulated turgor is exhausted. Before removing the leafless branches, fresh branches are placed nearby, and the silk worms readily find their own way to the new supply of food by themselves. This method provides an abundant supply of always fresh and naturally moist food, and eliminates the tedious work of transferring the worms from the dried leaves to the fresh ones as well as the waste in discarded dried leaves. The possibility of constantly maintain-



Legend: (*A*) — tank; (*B*) — air induction valve; (*C*) — air pressure gauge; (*D*) — valve with threaded neck; (*E*) — plant; (*F*) — air locking threaded nut; (*G*) — rubber stopper with round vertical opening; (G_1) — vertical section of *G*; (G_2) — self-closing rubber cork (alternative to *G*); (G_{2a}) — bottom view of G_2.

ing in the hatchery a high atmospheric temperature safeguards the worms from intestinal infections.

This abundance of always fresh, naturally moist food and the sanitary, even temperature in the hatchery result in raising healthier and more vigorous worms with much stronger silk glands. This method of feeding further results in the larvæ arriving at the cocoon stage in approximately 18 days, instead of the period of approximately 36 days now required. The quality of the silk produced by the larvæ raised by this method is equal to or better than that of the silk produced by the larvæ raised by the methods now employed. The output of the silk wadding substantially increases.

HORTICULTURE. The uses of the turgorator in the various fields of horticulture are so numerous that at the moment it is possible to indicate only a very few: rooting of plants difficult to root; grafting of species difficult to graft; preserving of cut plants; nourishing of cut stems; inducting of salt and other solutions into stems; measuring the quantity of water consumed by a plant, etc.

I have applied for a U. S. patent for the method of establishing artificial turgor in cut plants with the help of my turgorator. Any questions of commercial nature regarding this invention must be directed to my commercial agents, Paul Semion & Co. Inc. 1655 Polk Street, San Francisco 9, California.

516 Cole St., San Francisco, Calif., U.S.A.

SEX DIFFERENCES OBSERVED IN LARVÆ OF *DANAUS BERENICE*

by ALICE L. HOPF

In the first week of July, 1953, while vacationing at Daytona Beach, Florida, I was surprised to note several *Danaus berenice* Cramer flying in the neighborhood. I had supposed that this butterfly was confined to the southern part of Florida, around the Everglades. Since for the previous two years I had been breeding *Danaus plexippus* Linné for migration study, I thought it would be interesting to see how *D. berenice* compares to its northern cousin. Accordingly, I looked around for milkweed plants. We were staying near the river and the beach, and where there was vegetation, the ground was thickly covered with a kind of low palmetto which gave scant room for flowering shrubs. It was not until shortly before our departure that I discovered a few milkweed plants at a distance along the road from our cabins. These were a different species from our northern milkweed, and it was only

by breaking off a leaf from every plant in the vicinity, looking for the milky juice, that I finally found them. I was able to search the plants twice before leaving Daytona, and each time collected a half dozen eggs. The eggs looked exactly like those of *D. plexippus,* even under a magnifying glass, but it seemed likely to me that they were *D. berenice,* since *D. plexippus* must have long since gone north.

On reaching home, I found seven little caterpillars, and they made no objection to eating our common northern species of milkweed (*Asclepias syriaca*). Five of these were reared to the butterfly stage, but none could be induced to mate, although one female laid a number of infertile eggs.

Of particular interest was the comparison with *D. plexippus.* As noted, the eggs appeared the same. The *D. berenice* caterpillar is smaller and much darker than the larva of *D. plexippus.* The background color is black, and there is a yellow stripe along each side and an oblong yellow spot on the top of each segment. This caterpillar has three sets of fleshy protuberances instead of the two sets on *D. plexippus*, the extra ones being on the fifth segment behind the head.

When the caterpillars neared their maximum growth, I noted that their markings were not all alike. Two of them had uniform black and yellow markings as described above. But in three, the yellow markings on the tops of the 3rd, 4th, and 5th segments were greatly dulled and obscured. Moreover, one caterpillar had red coloring on the base of all six protuberances. Each caterpillar was put in a separate jar, marked with a description of the individual, and when the butterflies emerged, two from caterpillars with the uniform bright yellow markings were males, whereas the three from larvæ with the yellow spots obscured were females. The caterpillar with the red on the protuberances was one of the males. This was the last one to come out and suffered an accident, falling down to the bottom of the jar and being unable to climb back up the stick that had been placed there. It is unlikely that this accident had any connection with the red markings.

The *D. berenice* were in pupation for ten days, as opposed to the usual fourteen for *D. plexippus* (though *D. plexippus* has taken shorter and even longer periods here, depending on the temperature). When about to open, the *D. berenice* pupæ first turned black and then a chocolate brown. This last color would indicate a diseased and dying pupa in *D. plexippus,* but is the ground color of the wings of *D. berenice* and is natural for them. No appreciable difference was seen in the color and markings of the green pupæ of the two species, but *D. berenice* is somewhat smaller.

Thanks to the cooperation of a fellow Society member in Florida, Mr. W. M. DAVIDSON, I have been able to rear a dozen more *D. berenice* this past summer. This time the difference in coloration in the mature larvæ was again noted, and as before, the brightly colored ones all produced males, the duller ones all females. It would be of very great interest to know whether any other species of Lepidoptera show the sex difference this clearly in the larval form.

136 West 16th St., New York 11, N.Y., U.S.A.

THE HEREDITY OF SOME SPOT ABERRATIONS IN *LYCÆNA PHLÆAS* AND *L. HYPOPHLÆAS*

by LINCOLN P. BROWER and JANE VANZANDT BROWER

In Europe and to some extent in North America several aberrant forms of the common Copper butterflies, *Lycæna phlæas* L. and *L. hypophlæas* Bdv., have been reported. In this paper a few of the more important studies on spot aberrations and one significant investigation of another form will be reviewed and the results of one of our own rearing experiments will be presented.

The forms herein discussed fall into three categories. The first concerns the copper-colored band on the outer margin of the hindwing. In occasional specimens this band is replaced by black, and such aberrations have been named "obsoleta". From the data presented by HOLMES (1943) on *L. phlæas,* it is clear that the presence of this copper band is controlled by an autosomal gene which is dominant to its "obsoleta" allele.

The aberration in the second category has been termed "octomaculata". As is characteristic of the two species (or subspecies) under discussion, there are two rows of black spots basal to the copper band on the upperside of the hindwing which are indefinite in number and often indistinct. In "octomaculata" usually three to four black spots in each row are joined by more or less distinct blue scaling. In the same paper in which "obsoleta" was discussed, HOLMES also presented interesting data concerning "octomaculata". In short, his findings indicate that at least one pair of autosomal genes is responsible for this effect. Moreover, the allele for blue spotting appears to show intermediate dominance to the allele for lack of blue spotting, since the offspring of a strongly blue-spotted female $\times$ a normal male were "all with four dull blue spots on each hindwing." In the F_2 HOLMES obtained 129 specimens arbitrarily arranged from strong (42) to weak (87) blue spotting, plus 16 normal specimens. Although the Chi-squared test applied to his results indicates that the blue spotting is more likely controlled by two pairs of autosomal genes than by one pair, neither interpretation can yet be definitely accepted. In both explanations, the greatest deviation from the expected ratio is in the number of normal forms obtained. This fact itself suggests that some uncontrolled selective agent may have been operating to alter the ratios in the conditions under which the experiment was carried out. That natural selection can operate on these forms was indicated in JACOBS' (1920) observations of the proportion of blue-spotted to "normal" *L. phlæas* in two close but ecologically distinct areas. In a marshy area, he found that 80.7% (117 out of 145) of the specimens were blue-spotted, whereas in a dry meadow only 13.8% (54 out of 392) were blue-spotted. It is thus apparent that further investigation of "octomaculata" could produce some interesting results, especially if both European and American forms were to be considered.

The third and final category to be discussed in this paper includes several of the aberrations which affect the black spots on the wings of these two species (or subspecies) of butterflies. SMITH (1946) has conveniently classified these aberrations into four groups. The first two involve (1) a reduction (*i.e.,* proportional reduction) and (2) an increase (*i.e.,* proportional increase) in the size of the black spots. It is probable that these first two groups are influenced by environmental factors, especially temperature. This is indicated in the work of LEECH (1893), MERRIFIELD (1893a, 1893b), and WEISMANN (1895) on *L. phlæas,* which showed that spring specimens and adults reared from pupæ kept at low temperatures have smaller black spots than those of the summer brood or those from pupæ kept at high temperatures. SMITH'S third and fourth groups include those aberrations in which (3) the spots elongate inwards towards the base of the wing and (4) those in which the spots elongate outwards towards the outer margin of the wing. A typical example of inward elongation is the aberration "fasciata", described by STRECKER (1878). The extent of this inward elongation is extremely variable, a fact noted by SCUDDER (1899) and easily seen in looking over a good series of specimens. KLOTS (1951) and BROWER (1952) noted that this form is more common in some areas and in some years than others. This is substantiated by our own observations in New Jersey and Connecticut.

An example of outward elongation is found in the aberration "fulvus". SMITH pointed out that this outward elongation is much rarer than the inward elongation. The paucity of the former in collections supports SMITH'S statement.

In addition to these four groups, a variable number of anterior and/or posterior elongations of the black spots occurs in some individuals, especially on the underside of the wings, and we would therefore like to add this group to SMITH'S classification. Examples of these aberrations can be seen among the specimens of *L. hypophlæas* in the collection of Mr. OTTO BUCHHOLZ of Roselle Park, New Jersey.

SMITH emphasized "the lack of affinities" among butterflies showing these elongated spot aberrations and illustrated the same in a good plate. By "lack of affinities" he meant, for example, that elongation of the spots on the upperside of the forewing or hindwing may or may not be paralleled on the underside. Our own experience indicates that it is impossible to predict the condition of the spots on the underside of the wings by observing those above and *vice versa.* SOUTH'S (1893) observation also implied this, as did that of SABINE (1893), and SCUDDER wrote that ". . . the suffusion shows no preference for the upper or under surface of the wings or for one pair of wings" (p. 1351).

Finally, a sixth aberration which we feel should be added to SMITH'S classification (causally distinct from his first class) is "obliterata". In this variety, the extra-mesial spots on the upper and under sides of the forewing are lost or greatly reduced, and in some cases the discal spots are also gone.

It is our belief that these last four groups of aberrations — inward elongation, outward elongation, anterior and posterior elongation, and loss of spots — are primarily genetically produced, whereas the proportional increase and decrease in the size of the spots is largely environmentally controlled. The extreme variability in the extent of inward and outward and anterior and posterior elongation of the black spots and the noted lack of affinities suggest either modifying genes or environmental influence, or both. Evidence which we believe tends to support the hypothesis that "obliterata" and "fasciata", at least, are genetically governed will now be considered.

In 1899, SCUDDER mentioned a specimen of *L. hypophlæas* which was more or less typically "obliterata" on the upperside but tended to be more like "fasciata" on the underside. This led SCUDDER to believe that these two forms were "closely connected". The following observations may help to elucidate SCUDDER'S statement and suggest the possibility of genetic relationship between these two forms.

On 8 September 1953, two "fasciata" males, one "fasciata" female, and one worn "obliterata" female were taken in a field bordering the Great Swamp in Green Village, New Jersey. The "obliterata" female was brought back to the laboratory and induced to oviposit on *Rumex acetosella* L. (Sheep Sorrel). From the four eggs obtained, two individuals were reared to the pupal stage. Subsequently one male and one female emerged, neither of which was the normal form nor the maternal "obliterata" form. Both were the "fasciata" form. Our attempts to cross the F_1 may or may not have proved successful, but the female laid no eggs, thus terminating the experiment, which had been carried out under uncontrolled conditions.

A thorough genetic analysis of these findings is impossible without further data; however, the data obtained do suggest several possibilities, all of which could be tested by simple breeding experiments. For example, one interpretation is that "obliterata" and "fasciata" are controlled by two independent autosomal genes, each recessive to its allele for the normal color pattern. If this were the case, then the parent female would have been homozygous "obliterata" and heterozygous "fasciata", while her unobserved mate could have been either heterozygous or homozygous "fasciata", carrying one or two of the dominant wild-type alleles of "obliterata". Another explanation is that "obliterata" is controlled by a recessive sex-linked gene and "fasciata" by a recessive autosomal gene as in the first example.

However, one important but negative fact is evident. A comparison of these forms and normal individuals shows that the three types appear as three successive steps in extent of black spotting, with "obliterata" spotted to the least extent, "fasciata" spotted to the greatest extent, and the "normal" condition appearing intermediate between the two extremes. In the absence of breeding evidence it could have been hypothesized that a single pair of genes controls the three forms, with (*ff*) being "fasciata", (*Ff*) being "normal", and (*FF*) being "obliterata". The prevalence of the hypothesized normal (*Ff*) genotype in nature could then be explained by heterosis for the heterozygote and sublethality for both homozygotes. This possibility is eliminated

by our small F_1 brood, since an (*FF*) female could not produce (*ff*) offspring, regardless of the genotype of her unknown mate.

DISCUSSION

Very similar aberrations have been observed in other Coppers in addition to *L. phlæas* and *L. hypophlæas.* SMITH (1946) figures *L. dispar rutilus* var. "radiata", which shows outward spot elongation. In the BUCHHOLZ collection a striking aberrant male *L. epixanthe* Bdv. & Lec. from the cranberry bogs at Pakim Pond, New Jersey (23 June 1951), exhibits inward spot elongation on the underside of the forewings. In fact these aberrations are not limited to the Coppers but are also found in their near relatives, the Blues. According to SEITZ (1909), "As regards individual variability most species [*i.e.,* of Blues] are liable to modifications in the ocelli of the underside; these ocelli may be absent or reduced or enlarged, or their number may have increased; they may be ovate, elongate, or prolonged to form rays, or even confluent with one another. These modifications, which have all been found in nearly every species . . . certainly occur in all the species . . ." (p. 299). For other examples and illustrations of some of these forms, see also Geldart (1875), de Laussure (1914), Verity (1941), and Smith (1946).

If the American Coppers are considered alone, it is seen that the "obliterata"-like characteristics are usual in the males of several species, whereas the females of these same species normally tend towards the "fasciata" condition (*e.g., Tharsalea arota* Bdv., *T. virginiensis* Edw., *Lycæna gorgon* Bdv., *L. thoe* Guér., etc.). It is therefore possible that the aberrations which we have considered genetic in nature were important factors in the evolution of the different species. The results of further breeding experiments to ascertain the genetic nature of the aberrations, hybridizing of the different species to clarify further the nature of the spot inheritance, and the determination of relative frequencies of aberrations in several populations of each of the species would be of much interest.

SUMMARY

1. The present paper is concerned primarily with blue and black spot aberrations in *Lycæna phlæas and L. hypophlæas.*

2. A hypothesis is set forth in which the black spot "aberrations" are classified into two groups: those environmentally produced and those genetically controlled.

3. An analysis of a rearing experiment on *L. hypophlæas* suggests but does not prove the nature of the genetic control of "obliterata" (loss of black spots) and "fasciata" (inward elongation of black spots). However, balanced polymorphism involving these two forms and the normal form as controlled by a single pair of alleles is ruled out.

4. The occurrence of the black spot aberrations in Coppers and Blues in general is noted, and the importance of these aberrations in the evolution of the species of American Coppers is suggested.

The authors wish to thank Dr. C. L. REMINGTON for his helpful suggestions in the writing of this paper.

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Osborn Zoological Lab., Yale University, New Haven 11, Conn., U. S. A.

AN APPARENT HYBRID *LIMENITIS* FROM ARIZONA

by David L. Bauer

The year 1952 was a very good one for the three species of *Limenitis* found in the Verde Valley of central Arizona. The three species occupy for the most part separate habitats. *L. archippus obsoleta* Edwards is found at the lowest elevations, 3,000 ft. and less, among the Cottonwoods and Willows along the Verde River, and is never found far from this habitat. *L. astyanax arizonensis* Edwards is also found along the Verde River, but its chief habitat

is in the mountain canyons from 4000 to 5000 ft. and higher. *L. weidemeyerii angustifascia* Barnes & McDunnough is the high altitude species, usually being found from 6000 to 7000 ft. and up to 9000 and 10,000 ft. This distribution in elevation seems to be quite constant, although there are always exceptions. 1952 was one of these exceptional years in which there was a great deal of overlapping, particularly between *L. astyanax arizonensis* and *L. weidemeyerii angustifascia.*

Naturally I tried to lay in a good store of specimens. On August 18, 1952, while collecting *L. astyanax arizonensis,* I sighted a large black butterfly and did my best to catch it. After several attempts it was finally netted. Upon close examination it was apparent that in markings and color it was a mixture of *L. astyanax arizonensis* and *L. weidemeyerii angustifascia.* This is the only such specimen so far recorded, so a brief description follows. It is a male.

Upperside: predominantly rich blue-black with increasing bluish sheen on the secondaries. The submarginal row of white spots that are found in both species is present on all wings. The dark marginal and submarginal markings of *L. astyanax arizonensis* are present, but only barely perceptible against the blue-black ground. The white subapical spots of *L. weidemeyerii angustifascia* are present but reduced. The median row of white spots is entirely lacking, as is also the bright blue of the secondaries of typical *L. astyanax arizonensis.*

Underside: this side shows more of the *L. weidemeyerii angustifascia* characters. The marginal and submarginal markings of all wings are half way between the two species, as is also the general appearance and coloring. The white subapical spots of the primaries are the same as those of typical *L. weidemeyerii angustifascia.* The median row of white spots is present on the primaries between veins M_2 and M_3, and M_3 and Cu_1, and very faintly between Cu_1 and Cu_2. On the secondaries it is replaced by chestnut colored areas, which gradually diminish, become blackish, and disappear toward the anal angle. The marking of the basal half of all wings are as in *L. weidemeyerii angustifascia,* but the coloring of the spots is reddish orange as in *L. astyanax.* The ground color of the basal half of the secondaries is powdered with light whitish-blue.

It is possible that this specimen is close to what EDWARDS named *sinefascia.* However, I am not in a position to know.

Another interesting discovery was made when a number of *Limenitis* larvæ were collected on a narrow-leaved willow (*Salix*) and reared. When the butterflies emerged from August 8-26, at least five were *L. astyanax arizonensis.* The other two were *L. weidemeyerii angustifascia.* These larvæ were collected in July and emerged in late August. Thus *L. weidemeyerii angustifascia* is at least partially double brooded in some years. It was not realized at the time that the larvæ of both species had been collected, so no comparisons were made.

1103 Ballew Ave., Everett, Wash., U.S.A.

SIZE OF *PAPILIO GLAUCUS* IN MISSISSIPPI

by BRYANT MATHER

A consideration of a limited amount of information on *Papilio glaucus* L. in Mississippi suggests that the population represented there is generally similar to that described from the District of Columbia (Clark, 1932) and from Virginia (Clark & Clark, 1951). Specimens assignable to *P. glaucus australis* Maynard, reported from "the Southern States" (Holland, 1947) and from "Georgia through Florida and Gulf States" (Klots, 1951), have not been found. A series of four males and two females was examined by Mr. C. F. DOS PASSOS and determined as *Papilio glaucus glaucus.* No yellow females (form "turnus") are known to have been found in Mississippi; none were found in the collection at Mississippi State College when it was examined by the writer in March 1953. It is therefore assumed that the statement by HUTCHINS (1933): "*Papilio glaucus* L. Uncommon. *Papilio glaucus turnus* L. Very common," must refer to the occurrence of yellow males and dark females. Mr. and Mrs. HANS EPSTEIN report (*in litt.*) that no yellow females are known to them to have been found in Alabama. The very small spring individuals previously reported from "as far south as the mountains of North Carolina" (Clark & Clark, 1951) and from Kansas (Field, 1938), occur at least as far south as central Mississippi.

The series of twenty specimens in the writer's collection has been examined (other Mississippi specimens known to exist but which were not examined include those in the collection at Mississippi State College, five in the collection of C. F. DOS PASSOS, and one in the collection of Dr. FRANK MORTON JONES taken by him in Biloxi in the spring of 1910). Two dimensions of each specimen were measured : wingspread and forewing length. The measurements were made using dividers, opened to the dimension being measured and then placed against a millimeter scale. ***Wingspread*** is the dimension indicated by WOHLFAHRT (1952) as "Spannweite". ***Forewing length,*** the dimension used by CLARK (1932) and CLARK & CLARK (1951), is the distance from the base to the apex of the forewing, and presumably is the dimension referred to by BROWN (1951) as the "greatest radius of the forewing." These data are given in Table II, and some of their relations are indicated graphically in Fig. 1. For these twenty specimens, the ratio of wingspread to forewing length varies from 1.50 to 1.77; the average is 1.63. Both the specimen with the 1.50 ratio and that with the 1.77 ratio are females. Fig. 1 indicates that there appears to be no tendency for the ratio to change with change in forewing length, with season, or with sex. The tendency for size to increase from spring to fall, and the tendency for females to be larger than males, are clearly indicated. No correlation is indicated between size and section of the state in which taken. Since the series includes only one specimen from the Gulf Coast, the possibility that a significantly different population, perhaps assignable to *P. glaucus australis,* occurs there remains to be investigated.

Information on the size range of *P. glaucus* is given in Table I. In all references except Clark (1932) and Clark & Clark (1951) the dimension given is "expanse." Reported values for expanse in inches have been converted to expanse in millimeters by multiplying by 25.4 and from expanse in mm. to forewing length in mm. by the formula:

$$\text{Forewing length} = 0.5\ (\text{expanse} - 4).$$

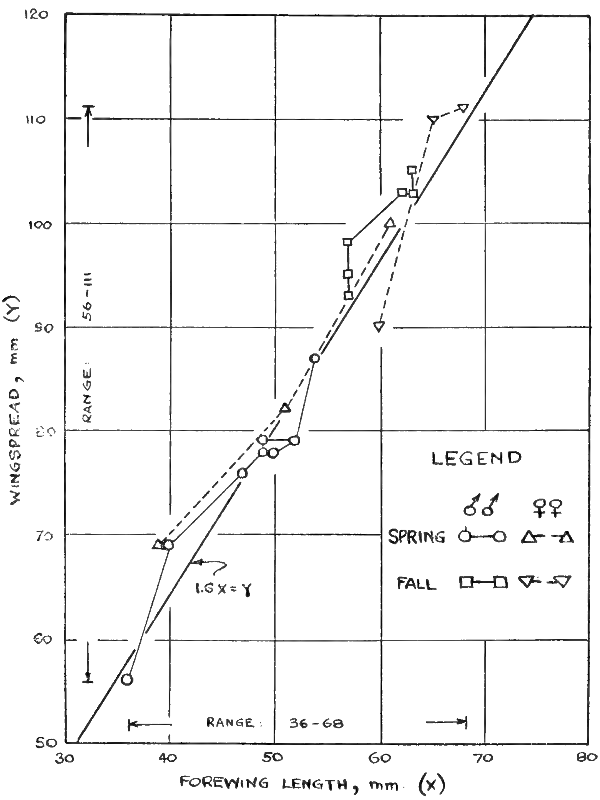

Fig. 1. Measurement relations of 20 *P. glaucus* from Mississippi.

The smallest length indicated by the references is 36 mm., the greatest 80 mm. (the greatest indicated in any reference other than Klots is 69 mm.); the extremes of the twenty Mississippi specimens are 36 and 68 mm. It is therefore suggested that the size range of *P. glaucus* in Mississippi is as great as is the size range of the species in the entire United States, except Florida. The CLARKS (1951) report Florida females with forewings up to 76 mm. in length; KLOTS (*in litt.*) refers to a yellow Florida female with a forewing length of 81 mm. as "not the largest I have seen."

It is extremely unlikely that the present series includes the extremes of size that occur in Mississippi, but it is believed also unlikely that specimens

materially smaller than the smallest included here will be found. Further collecting would provide confirmation of these assumptions. A larger, statistically more significant, series would permit calculations of frequency distribution by size, and, together with similar data from other areas, would permit comparisons between populations.

TABLE I. Forewing length, mm. (reported or computed)

Reference	Range	Min.	Max.	Min.-Max. Males	Min.-Max. Females
Macy & Shepard (1941,p.45)	25	36	61	....	....
Holland (1947,p.318)	25	36	61	36-49	42-61
Elrod (1906,p.21)	25	36	61	36-49	42-61
Wild (1939,p.18)	5	38	43	....	....
Saunders (1932,p.224)	6	49	55	....	....
Klots (1951,p.175)	31	49	80	....	....
Clark (1932,pp.184-5)	27	42	69	42-60	50-69
Clarks (1951,pp.135-6,140)	27	42	69	42-60	50-69
Haydon (1933,p.9)	25	36	61	36-52	42-61
20 Mississippi specimens	32	36	68	36-63	39-68

As was noted above, all the references to size except those by the CLARKS are to ***expanse.*** In none of them is a definition of expanse given. The following definition is given by FIELD (1938): "Expanse: the distance between the apices or other widest point of the wings when fully spread." The term "fully spread", as used in this definition, could have more than one interpretation. KLOTS (*in litt.*) states that the values given in the *Field Guide* (1951) refer to "wing expanse, obtained by adding the width of the thorax to two times the forewing length." This is an entirely clear definition and agrees with that indicated diagramatically for "Flugspanne" by WOHLFAHRT (1952). I fail, however, to see advantages to the use of expanse as the basic measure of butterfly size. The determination of expanse requires measurement and summation of two dimensions. Wingspread, involving measurement from the apex of one wing to that of the other, is not reliable, because it will vary depending on the spreading of the insect. Following length is a single, reliable, easily determined dimension and would seem to be the most useful.

A number of authors state dimensions in the style "3.00 to 4.25 in." It is doubted that the apparently indicated accuracy or precision to the nearest 0.01 in. is intended. If by "3.00" is meant "nearer 3 than 2¾ or 3¼" and if by "4.25" is meant "nearer 4¼ than 4 or 4½"; then it would be more accurate and distinctly preferable to write "3 to 4¼". It is misleading to write "3.00" unless it is intended to imply that the true value is greater than 2.995 and less than 3.005 (Simpson & Roe, 1939: p. 25). It would, of course, be much better to obtain and report such data in millimeters.

A series of as few as twenty specimens may provide the basis for tentative conclusions about certain significant characteristics and relations of the population sampled, provided that the series is considered as a sample and the conclusions are restricted to those justified by the sample. Extreme variants in a sample of any size should neither be ignored as freaks nor regarded as great prizes. They have equal significance with more typical specimens in giving the complete picture of the population of which they are members.

TABLE II. Data on Twenty *P. glaucus* from Mississippi

Section*	Locality	Sex	Date	Forewing Length, mm.	Wingspread, mm.	Ratio, W/FL
C	Clinton	M	8 Mar 53	36	56	1.55
N	Iuka	M	29 Mar 53	40	69	1.72
C	Clinton	M	8 Mar 53	47	76	1.62
N	Glen	M	29 Mar 53	49	78	1.59
C	Clinton	M	7 Apr 52	49	79	1.61
C	Clinton	M	2 Apr 52	50	78	1.56
C	Clinton	M	15 Mar 53	52	79	1.52
C	Clinton	M	15 Mar 53	54	87	1.61
	Average (spring males)			47.1	75.2	1.60
C	Clinton	M	10 Aug 52	57	93	1.63
C	Clinton	M	25 Jul 52	57	95	1.67
C	Vicksburg	M	10 Jul 51	57	98	1.72
S	Moss Point	M	3 Oct 53	62	103	1.66
C	Clinton	M	27 Sep 52	63	103	1.63
C	Vicksburg	M	17 Aug 51	63	105	1.67
	Average (fall males)			59.8	99.5	1.66
N	Tishomingo	F	28 Mar 53	39	69	1.77
N	Iuka	F	29 Mar 53	51	82	1.61
C	Clinton	F	9 Apr 53	61	100	1.64
	Average (spring females)			50.3	87.3	1.67
C	Clinton	F	24 Aug 52	60	90	1.50
C	Clinton	F	22 Jul 52	65	110	1.69
S	Hattiesburg	F	23 Sep 51	68	111	1.63
	Average (fall females)			64.3	103.7	1.61
	Grand Average (all twenty)			54.0	88.0	1.63
	Range (all twenty)			36-68	56-111	1.50-1.77

*N=North, C=Central, S=South [Moss Point (S) to Glen (N) = 300 miles]

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P.O. Drawer 2131, Jackson, Miss., U. S. A.

NOTES ON *ERESSA CONFINIS* AND ALLIED SPECIES WITH DESCRIPTIONS OF A NEW SPECIES AND A NEW SUBSPECIES (CTENUCHIDÆ)

by NICHOLAS S. OBRAZTSOV

The Asiatic species known as *Eressa confinis* (Walker, 1854) has already been discussed in some notes and redescribed by HAMPSON in 1898. A synopsis of its variation was completed by the same author in his supplementary work of 1914.

The materials of the U.S. National Museum containing a series of moths of this group, known previously as a single species, gave me an opportunity to revise them, to establish the taxonomic value of some synonyms, and to describe a new subspecies of *E. confinis* from West China and a new species from Java. I am very obliged to Mr. J. F. GATES CLARKE of the National Museum for his kind assistance in giving me the materials for the completion of the present paper and to Dr. A. N. DIAKONOFF for sending the moths from the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands. Like the earlier authors, I had at my disposition chiefly male moths of the group in question.

Eressa confinis Walker ssp. *confinis* Walker

Glaucopis (Eressa) Walker, 1854, List Spec. Lep. Ins. B.M., vol. 1: 149.

Syntomis confinis Walker, 1856, *op. cit.,* vol. 7: 1592; Hampson, 1893, Moths Ind., vol. 1 (1892): 223.

Eressa confinis (Wkr.) Moore, 1882, Lep. Ceyl., vol. 2: 36, t. 95 fig. 6; Swinhoe (& Cotes), 1887, Cat. Moths Ind.: 52; Kirby, 1892, Synon. Cat. Lep. Het., vol. 1: 104; Swinhoe, 1892, Cat. East. & Austral. Het., vol. 1: 40; —, 1895, Trans. Ent. Soc. London: 32; Hampson, 1898, Cat. Lep. Phal., vol. 1: 116, fig. 38; —, 1900, J. Bombay N. H. Soc. 13: 223, fig.; Zerny, 1912, Wagner's Lep. Cat., pars 7: 32; Seitz, 1913, Gross-Schm. Erde, vol. 10: 83; Hampson, 1914, Cat. Lep. Phal., Suppl., vol. 1: 46; Fletcher, 1925, Cat. Ind. Ins., pars 8: 25; Wileman, 1928, Trans. Ent. Soc. London 76: 445.

The above mentioned redescription of *E. confinis* by HAMPSON corresponds to the nominotypical subspecies from India. The male genitalia (fig. 1) are as follows: Tegumen with two large, roundish, lateral appendages; uncus relatively shorter than in allied species described in this paper, with a broad, latero-basal enlargement and the tip curved downward. Valva with an elongate cucullus; sacculus much narrower than the upper part of the cucullus, with a tip directed upward.

Eressa confinis Walker ?ssp. *musa* Swinhoe

Eressa musa Swinhoe, 1885, Proc. Zool. Soc. London: 290, t. 20 fig. 1; Swinhoe (& Cotes), 1887, Cat. Moths Ind.: 52; Kirby, 1892, Synon, Cat. Lep. Het., vol. 1: 104.

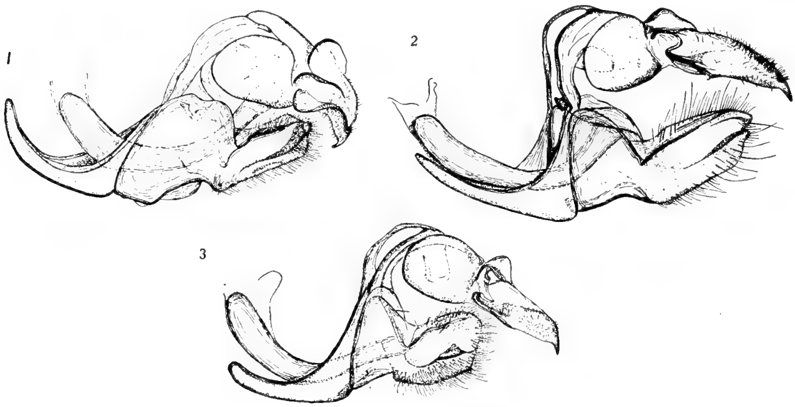
Syntomis musa Hampson, 1893, Moths Ind., vol. 1 (1892): 222.

Eressa confinis ab. *musa* Hampson, 1898, Cat. Lep. Phal., vol. 1: 116; Zerny, 1912, Wagner's Lep. Cat., pars 7: 32; Seitz, 1913, Gross-Schm. Erde, vol. 10: 83.

Eressa confinis (*part.*) Fletcher, 1925, Cat. Ind. Ins., pars 8: 25; Wileman, 1928, Trans. Ent. Soc. London 76: 445.

This form, established originally as an independent species from Bombay, is a variety of *E. confinis.* The problem of whether it might be a subspecies or a simple aberration (individual variety) of the latter species, could not be solved because only a single male specimen from Mhow, Indore, Central India (U. S. National Museum, preparation of genitalia No. 4533, W. D. F.), corresponding in the wing pattern to the original description and the figure of *E. musa,* was at my disposal. The genitalia of this moth are identical with those of ssp. *confinis.*

The question of the identity of *Syntomoides finitima* Wileman, 1910, from Formosa (ranked by HAMPSON, in 1914, as a synonym for *E. confinis),* could not be solved because I had no specimen of this form at my disposition.



MALE GENITALIA. Fig. 1: *Eressa c. confinis* Wlk. Fig. 2: *E. catoria* Swinh. Fig. 3: *E. javanica* n. sp.

Eressa confinis Walker ssp. *szechueniensis,* new subspecies

MALE. Antennæ white at tips. Head and body coloring and the structural characters as in ssp. *confinis.* Length of forewing: 11-13 mm. The wing spots as large as in ssp. *confinis* but the forewing interno-median spot ($m_1 + m_3$) extends further towards the wing base and is enlarged there; the hindwing spots confluent in a large hyaline area occupying the whole middle cell and all interspaces of veins from costa to vein A_2 leaving a grayish black wing border as large as in ssp. *confinis.*

Described from male HOLOTYPE and eight male PARATYPES from south of Sui-fu, Szechuen, West China, D. C. GRAHAM leg., U. S. National Museum (preparation of genitalia of a paratype No. 4529, W. D. F.).

A further male specimen in the same collection from Shin-Kai-Si, Mount Omei, Szechuen, 4400 ft., belongs also to this new subspecies. This last specimen has a little additional spot above the base of the forewing vein R_5 like the three males of the type series and corresponds to f. *musa.*

Eressa confinis Walker ssp. *malaccensis* Rothschild

Eressa confinis malaccensis Rothschild, 1910, Nov. Zool. 17; 437; —, 1912, *ibid.* 19: 376, t. 4 fig. 6; Zerny, 1912, Wagner's Lep. Cat., pars 7: 32; Seitz, 1913, Gross-Schm. Erde, vol. 10: 83, t. 12 a, fig. 7; Candèze, 1927, Enc. Ent., ser. B, Lepidopt., vol. 2: 75; Joannis, 1928, Ann. Soc. Ent. France 97: 246; Wileman, 1928, Trans. Ent. Soc. London 76: 446.

Eressa confinis (*part.*) Hampson, 1914, Cat. Lep. Phal., Suppl., vol. 1: 46; Fletcher, 1925, Cat. Ind. Ins., pars 8: 25.

Eressa deliana Roepke, 1935, Miscell. Zool. Sumatr. 99: 2, fig. 1.

Structural characters as in ssp. *confinis.* Antennæ white at tips. Two yellowish orange patches on thorax, one anterior and one posterior. Patches on pectus and at the middle of the abdominal tergites and sternites yellowish orange; the upper patches at sides of the abdomen slightly reddish orange. Length of forewing: 9-11 mm. Wings brown, rather densely scaled, the hyaline spots arranged as in subspecies *confinis* but differently shaped. The middle cell spot (m_2) of forewing short, the rest of the forewing spots smaller with the veins having a broader brown scaling; the extra spot between spots m_4 and m_5 dot-like and in one specimen absent. Only the distal half of the hind wing middle cell hyaline; the spots of the hyaline area of hind wing separated one from another by dark brown veins; these hyaline spots smaller than in ssp. *confinis;* the spot below the hind wing middle cell divided by a brown longitudinal streak and the lower part of this spot sometimes poorly developed.

The above description is based upon three male specimens from Bangkok, Siam, in the U. S. National Museum (preparation of genitalia No. 4530, W. D. F.) which correspond very well to the original diagnosis of ssp. *malaccensis* known now only from Penang (Waterfall Valley) and Tonkin.

A single female specimen present in the collection, from Bangkok, is paler than the male specimens. Its vertex is yellow. The abdomen has yellow middle patches on 4th to 7th tergites, the postsegmental edges of these tergites diffusely yellowish scaled; in addition, the postsegmental edge of 7th tergite is covered with a whitish felt-like pile; the lateral patches are as in the male but broader; the yellow spots of the corresponding sternites are very broad. The wing spots are larger than in the male but nevertheless smaller than in the male of ssp. *confinis,* the hind wings are similar to those in the latter subspecies. Length of forewing: 11 mm.

A fourth male specimen in the U. S. National Museum, labelled "Siam, Cockerell", differs from the preceding series from Bangkok only by somewhat larger hind wing hyaline area with veins crossing it not dark scaled. A male specimen from the province Bienhoa, Cochin China, is more similar to the series from Bangkok.

From East Sumatra ROEPKE, in 1935, described *Eressa deliana* as a new species. The wing characters were described very insufficiently. ROEPKE wrote only about the forewing "with three distal and four proximal hyaline spots." The male genitalia of *E. deliana* presented in a figure by this author are very similar to those of *Eressa confinis,* and *E. deliana* is undoubtedly conspecific with it. The broadness of the uncus base, a narrow sacculus with the tip directed upward and extended to the nearby exterior edge of the upper part of the valva, the mentioned pigmentation, and the pattern of the body confirm this point of view.

In the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, there are one male and three female specimens from North Sumatra ("Medan S. O. K. v. d. Meer Mohr, 24-12-1931, 15-1-1932, 8-11-1932, Lampoe") which cannot be distinguished from *E. confinis* ssp. *malaccensis.* The female specimens have darker scaling of the forewings than the female from Bangkok, and the abdominal patches are not so diffusely traced, but there is no doubt

that these females and the male belong specifically together. The genitalia of the Sumatran male specimen (Rijksmuseum, preparation No. Ct. 1) does not differ from those of E. *confinis.*

There is little probability that there are on Sumatra two different subspecies of *E. confinis;* therefore, the above series from North Sumatra is presumably the same as *E. deliana.* The correctness of this supposition finds its confirmation in Roepke's statement that there are three distal forewing spots in *E. deliana;* in the ssp. *malaccensis* (males!) they are the spots m_4, m_5, and m_6 which are well developed while the extra spot between m_4 and m_5 is dot-like or missing. In the male from Medan this spot is very small.

A further male specimen from Hongkong (Rijksmuseum, preparation of genitalia No. Ct. 2) belongs to the ssp. *malaccensis* too.

Eressa catoria Swinhoe

Eressa confinis ab. 2 Hampson, 1898, Cat. Lep. Phal., vol. 1: 116.

Eressa catoria Swinhoe, 1900, Ann. Mag. N. H., ser. 7, vol. 6: 305.

Eressa confinis (*part.*) Zerny, 1912, Wagner's Lep. Cat., pars 7: 32; Hampson, 1914, Cat. Lep. Phal., Suppl., vol. 1: 46; Fletcher, 1925, Cat. Ind. Ins., pars 8: 25; Wileman, 1928, Trans. Ent. Soc. London 76: 445.

Eressa confinis catoria Seitz, 1913, Gross-Schm. Erde, vol. 10: 83.

MALE. Antennæ bipectinate, black, white tipped. Head entirely black. Patagia, tegulæ, and thorax black, the last with a large orange patch at the anterior edge and another one at the posterior edge; pectus with two orange patches on each side. Legs entirely brownish black. Abdomen black; 2nd to 7th tergites with a middle and two lateral orange patches each; the corresponding sternites yellow patched in the middle. Length of forewing: 12-13 mm.

Wings rather diffusely smoky black scaled, with very sparsely haired, white hyaline spots. Forewing with an elongate spot (m_2 in the middle cell extending nearly from the base of vein Cu_2 to the smoky black scaling around the discal veins; a large spot below the middle cell, close to this latter and the neighboring veins; this spot extends to the middle of vein Cu_1; an elongate spot (m_3), a third shorter than the preceding one, between veins Cu_1 and A_2, with the base at the same level as both preceding spots; a narrow elongate spot between vein A_2 and the dorsum; a little triangular spot between veins R_4 and R_5, at the base of these veins; a slightly curved, wedge-shaped, elongate spot (m_4) extending nearly to the base of vein M_1 between this vein and the radius; a shorter spot below the middle of the preceding one; an irregular ovoid spot (m_5), larger than the spot above, at the base of veins M_2 and M_3 and between them; a longer, subrectangular spot (m_6) in the interspace below; all spots separated one from another by a narrow, black vein scaling, this latter a little broader along vein M_2; both the upper exterior spots (m_4 and the extra spot below it) separated from the middle cell spot (m_2) by the above mentioned black scaling around the discal veins. Hind wing with two middle large, ovoid spots between veins M_2, Cu_1, and Cu_2; a slightly translucent black scaling (an underdeveloped spot) below vein Cu_2. (SWINHOE, in 1900, mentioned a tendency of the hind wing spots to reduction and wrote: "in many specimens both these small spots are indistinct." HAMPSON, in 1898, mentioned a male specimen with entirely black hind wings.)

Genitalia (fig. 2): tegumen with two large, roundish, lateral appendages; uncus very long, with a moderate, latero-basal enlargement and a rather direct tip. Valva with an elongate cucullus; sacculus a little narrower than the upper part of cucullus, with a tip not curved upwards and extending to the distal edge of valva.

. This species was established as an independent one, but ZERNY and others ranked it as a synonym or at least considered it a variety of *E. confinis.*

The type locality was given Jaintia Hills ("Many examples, all males"); HAMPSON, in 1898 added Bhutan and Khásis.

The present redescription of this independent species was made from a male specimen from Assam, collection W. SCHAUS, at present in the U. S. National Museum (preparation of genitalia No. 4532, W. D. F.). This specimen in 1923 was compared by W. SCHAUS with the type of *E. catoria* in the British Museum of Natural History, London, and found identical with it.

Eressa confinis intensa Rothschild, 1910, has some resemblance to *E. catoria,* but I have not studied it.

Eressa javanica, new species

MALE. Antennæ bipectinate, brown black, white tipped. Head brown black, vertex, cheeks and a little dot at the tongue base, yellow. Patagia and tegulæ brown black, the anterior edge of patagia and the lateral ones of tegulae slightly touched with yellow; thorax black brown with a large yellow patch at the anterior edge and another one at the posterior edge; pectus with yelow scaling at both sides. Legs smoky brown, slightly coppery glossed. Abdomen grayish black; 1st tergite diffusely yellowish scaled; 2nd tergite with lateral yellow patches and a middle postsegmental patch; 3rd to 6th tergites with a yellow middle patch and two lateral ones each; postsegmental edge of the 7th tergite broadly yellow; 8th tergite entirely black; 2nd to 6th sternites with a yellow, broad, middle patch each. Length of forewing: 10 mm.

Wings rather diffusely smoky brown scaled, with very sparsely yellowish haired, white hyaline spots. Forewing with a short trapezoidal spot (m_2) in the middle cell extending from the base of vein Cu_2 to a rather large, smoky brown scaling around the discal veins; an elongate oval spot below the above spot and equally long with it; an elongate spot ($m_1 + m_3$) below the middle cell and vein Cu_2; this spot begins half-way between the wing base and the middle cell spot (m_2) and extends to about one-half of the vein Cu_2; a clear space below vein A_2 separated by it from the spot $m_1 + m_3$; an elongate oval spot (m_4) between veins R_4 and R_5, remote from the base of these veins; a much shorter and narrower spot in the next lower vein interspace; two broader, slightly elongate spots (m_5 and m_6) in the interspaces between veins M_2 and Cu_1; the upper of these spots a little shorter than the lower; all exterior spots separated from the middle cell by the above mentioned large, smoky brown scaling around the discal veins. Hind wing with hyaline spots in the middle cell and in the neighboring interspaces between the dark scaled dorsum and vein M_3; all these spots form a common hyaline area extending to about two-thirds of the wing length and divided by blackish veins.

Genitalia (fig. 3): tegumen with two large, roundish, lateral appendages; uncus almost equally broad, with a moderate, latero-basal enlargement and a rather direct tip. Valva with a broad, rounded cucullus; sacculus rather broad, with a tip directed upwards and very remote from the distal edge of the upper part of cucullus.

Described from the unique male TYPE from Mount Gede, Java, 9000 ft., BRYANT & PALMER leg., U. S. National Museum (preparation of genitalia No. 4531, W. D. F.).

This species is very similar to *E. confinis* but differs from it by a yellow collar, yellow edged patagia and tegulæ, a distinct disposition and number of yellow abdominal patches, and especially in the genitalia. From *E. lutulenta* described by SNELLEN in 1879, the new species differs by not having an orange frons, by the abdomen not being banded but only patched with yellow, and by a common hyaline area of the hind wings, which last in *E. lutulenta* is composed of separate spots.

11 Cromwell Place, Sea Cliff, L.I., N.Y., U.S.A.

NOTES ON THE OCCURRENCE OF *ALSOPHILA POMETARIA* (GEOMETRIDÆ) AT BAIE D'URFÉ AND MACDONALD COLLEGE, QUEBEC, IN 1953

The first male *Alsophila pometaria* Harris was seen on Oct. 16, when 2 were captured. Females were sought on Ash, Elm, and Manitoba Maple on Oct. 9, 11, and 14, and were not found; 9 were taken on Oct. 16. Trees were examined by day as well as at and after 6 p.m., up to Dec. 2, except on nine dates. Observations and captures were made mainly on 12 trees in the home garden; some on 25 trees in the next neighbour's garden, and some on 48 trees in a grove at Macdonald College, distant about one-half mile. The majority of the specimens were taken on the trees in the home garden: relatively few were found at each search on the other groups of trees. A few of the specimens were found on Sugar Maple, Soft Maple, and Poplar. The weather was mainly fine and warm, with a light frost on Nov. 4/5; that was followed by a sleet storm on Nov. 7, during which several of the female moths were found frozen in the ice on the trees. Mild weather followed, and there was a heavy rain on Nov. 25. The temperature fell on Nov. 26, and snow and a ground-heaving frost occurred on Dec. 1.

The captures and observations have been divided into two periods, as shown below, before the first frost and after it.

	Males	Females	F/M
Oct. 16 — Nov. 4	242	1062	4.3
Nov. 5 — Dec. 4	3	707	236.0

The approximate ratios of females to males on selected dates were as shown below:

Oct. 16 — 24	7.0	Oct. 27	5.0
Oct. 25	4.5	Oct. 30	2.0
Oct. 26	3.0	Nov. 2	8.0

The greatest number of mating pairs was observed on Oct. 29, when the number of males was 38 and of females 125 on 12 trees. The last male was seen on Nov. 14, after which about 400 females were taken or observed.

It was noted that most of the specimens of both sexes were found below the 6 ft. height on the boles; the proportion of females found at the 10 — 14 feet height to those found up to 6 feet on the same (four) trees was ascertained on one occasion to be as 1 : 10 (14 to 143).

Emergences appeared to be most numerous before 6 p.m. When all of the visible specimens were taken between 6 and 8 p.m. there were none or very few visible up to 6 feet on the 12 trees the next morning. Observations have not been made of insectivorous birds being responsible for any depletion.

The observations show that in the fall of 1953 in this locality almost all of the males had emerged from the pupæ a day or so before the first frost; about one-third of the females emerged after the first frost.

P. H. H. GRAY, Box 236, Macdonald College, Que., CANADA

The Fifth Annual Meeting of the Society will be held Tuesday, Wednesday, and Thursday, 28 - 30 December 1954. We will meet at the Carnegie Museum in Pittsburgh, Pennsylvania. A special feature will be the opportunity to see the great collection of Lepidoptera assembled by W. J. HOLLAND, WILLIAM HENRY EDWARDS, B. PRESTON CLARK, ANDREY AVINOFF, W. R. SWEADNER, and many others. The curator of the Lepidoptera collection is HARRY K. CLENCH. Dr. G. E. WALLACE (Chairman), Mr. & Mrs. C. G. MERKER, and Mr. CLENCH comprise the Committee on Local Arrangements; Mr. CLENCH is Chairman of the Program Committee. A large attendance seems assured, with very wide geographic representation.

BUTTERFLIES AND HILLTOPS

by JOHN P. KNUDSEN

The recent discussion which has been carried on in the pages of this journal has surely served to show that there is a marked tendency for certain butterflies, particularly *Anthocaris midea* Hbn. (Arnhold, 1953) and several of the papilios, (Merritt, 1953: Guppy, 1953), to congregate on the tops of hills. On March 30, 1953, the author visited the top of Kennesaw Mountain near Marietta, Georgia, and observed there a remarkable assemblage consisting principally of *Anthocaris midea* and *Papilio marcellus* Cram. along with a smaller number of *Papilio asterius* Stoll. During the climb to the top of the peak isolated members of each of these species were observed flying steadily up the hill, following one of several more or less open routes to the summit. At the summit itself there were several hundred butterflies in an area of a few hundred square feet; the effect was much like a local snow flurry whirling about the peak. Although *A. midea* is generally rare or uncommon in this region, a dozen could be seen at a glance, all males and all fresh and active. The same was true of the more common *P. marcellus*. Dozens of fresh males and no females were seen. Two weeks after the first visit I returned to the Mountain and again found a large assemblage of butterflies at the summit. *A. midea* was still there, all males as before and now pretty well battered. The Papilios were still in good supply, and in addition many males of *Melitæa ismeria* Bdv. & Lec. in fresh condition were there.

The above observations when taken with previously published material seem to indicate two things. First, the congregations observed to date have been largely or exclusively of male butterflies. Second, the phenomenon is more widespread than heretofore indicated and is not confined to any particular group or family of butterflies. The explanation of these congregations has been the matter of considerable debate, and widely differing opinions have been offered. It seems fairly clear that since the groups are almost exclusively male, the underlying cause is not a search for food plant as suggested by MERRITT (1953). Indeed, on Kennesaw, at least, the food plants and females are found on the lower slopes or at the base of the mountain. For this reason ARNHOLD'S (1953) suggestion that the hill tops are the area in which the butterflies emerge either from hibernation or chrysalid seems unlikely. The wind has been suggested as the agent serving to concentrate the butterflies, and it seems that some such explanation may have merit although not precisely in the fashion that has been suggested.

BEALL (1953) suggests that the explanation may lie in a process of unidirectional flight, the butterflies moving slowly against the wind until they reach the crest of a hill where they are lifted up and carried back to begin the cycle anew. Although this explanation is interesting it involves the assumption of a tendency toward unidirectional flight in all the species in the congregation, and fails entirely to account for assemblages on still days.

A simpler explanation can be based on the normal thermal updrafts which are found on the sunny side of any slope, particularly an isolated one such as Kennesaw Mountain. During bright days, especially in the spring before the leaves are fully out, a slowly rising current of warm air will form and move up the sunny side of a hill as the result of heating the layer of air close to the ground. Such air movement is definite and measurable, but so subtle as to be overlooked in many cases. It seems reasonable that a butterfly moving at random could be carried up in such a gentle movement without recognizing the fact that it is drifting slowly toward the summit of the hill. Once at the summit the insect may either remain there as one of a large number similarly assembled, or it may continue in the warm current of air which as it rises and cools eventually becomes a falling current carrying the insect back to the base of the mountain. Thus the process may be a cyclic one in which the assemblage at the top of the hill has a shifting population constantly gaining new members from the lower levels while at the same time some individuals are rising up away from the summit to begin the long journey back to the base. That such a shift of population actually takes place is indicated by the fact that although new arrivals appear continuously the total number of individuals at the summit remains nearly constant. Such an explanation of congregations would lead us to expect that the greatest numbers would appear in the early afternoon hours of fairly warm and sunny days, when the thermal currents up the slopes are most highly developed. On windy days or in cloudy weather the effect would not be sufficiently strong to be observed. These ideas seem to be borne out by the author's observations on Kennesaw Mountain. In the mornings the population density at the summit was found to be little higher than that on lower slopes, while in the early afternoon the population density on the peak was much greater than that on the slopes below. On cloudy and/or windy days there was no marked tendency to congregate at the summit, even though plenty of butterflies were on the wing and the temperatures were in the high seventies.

The predominance of males in these assemblages is probably due to the difference in the flight pattern of the males and females. In their competitive search for females, the males may fly higher and be more prone to wander than the females, whose principal concern is the location of food plants and ovipositing.

In recapitulation, it is the author's suggestion that the congregation of butterflies on hill tops is due in large measure to the gentle mass flow of heated air up the sides of the hill together with the natural instinct to rove in search of females which is manifest in the males of certain species.

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120 South Boundary St., Chapel Hill, N.C., U.S.A.

BUTTERFLIES ON HILLTOPS

by Vera Molesworth Muspratt

It has been with interest that I have read in *The Lepidopterists' News* the articles on butterflies congregated on hilltops in America. Here too in the surrounding country of St. Jean-de-Luz, Basses Pyrénées, some species do exactly the same thing, and I have for some years now specially noted their behaviour on three hilltops in this region.

An undulating plain to the east of the Atlantic runs from Bayonne to the Spanish frontier in the south, and the depth is about 8½ km. The Pyrenees start rising almost on the French coast at the frontier; running east they get higher as they get further inland but the first high hill, 900 meters, is only about 9½ km. as the crow flies from St. Jean-de-Luz.

Two of my hilltops are on low lateral spurs of the higher hills; one stands alone on the plain. A great deal of this plain is uncultivated and covered principally in gorse and bracken. However, farms are dotted all over the country with cultivated fields near them; small woods are here and there, principally oak, and the valleys have been cultivated for centuries. On the N. W. side of these hills there is a large stretch of uncultivated land swept by the western gales from the Atlantic; it is on the N.E. or S. that the nearest farms are found below the hilltops. Only occasionally butterflies are found on the higher hills, and I think this uncultivated land is unattractive to most of them.

The species involved are *Papilio podalirius* L., *Papilio machaon* L., and *Pararge megæra* L., and to a lesser extent *Vanessa atalanta* L. and *Aglais urticæ* L. The first three are sedentary, the latter migrants. The two *Papilio* are scattered in the region but are not seen anywhere on the plain in numbers; only once have I seen *P. podalirius* in profusion in a valley, having evidently just emerged from a hedge in which was a quantity of their food plant. Both these species are not in great numbers on the hilltops—8, 10, or 12 at the appropriate times of the year. *P. megæra* is common everywhere but evidently also likes hilltops as they are to be found there in greater numbers than anywhere else. The food plants for the larvæ of these three species are all more or less near to the hilltops but are also all over the plain.

V. atalanta overwinters with us in small numbers. They are also scattered all over the region and come out on sunny days in the winter and spring when the temperature is 10° C. in the shade. Very few are seen in late spring and summer. *A. urticæ* is curiously a very rare species in this region; since 1923 I have only seen one specimen, apart from the few I have observed only on one hilltop. I have never found any larvæ of either of these species in spite of numerous Nettles everywhere, and I think that they must go farther north to lay.

The highest of the three hilltops is the Redoute Louis XIV and is 244 m. alt. On top there are a couple of rows of old oak trees banked at the back with earthworks, but there are gaps in the rows so that many bushes and bracken are in full sun like the trees.

On sunny days at the appropriate season *P. podalirius* and *P. machaon* are found up there. They fly in a leisurely fashion (though not easy to catch), coming and going, and very often come back to the same twig, leaf, or frond to bask in the sun. If they go to the N.W. side of the hill they come back fairly quickly; sometimes they circle around in a more or less definite pattern. Both *V. atalanta* and *A. urticæ* have a bolder quicker flight, but they also fly often in a pattern. Of course at certain times they probably go off for good to the north or south according to the season, but I have not actually seen this as I have seen *V. atalanta* in my garden in autumn.

P. megæra is about on the hilltops in places that are stony and bare, no pattern to their flight; as long as they are in full sun and out of a cool breeze they seem content.

The second hilltop, 98 m. alt., is unnamed and is a slightly higher part of a ridge that runs above a valley which is just above sea level; quite close to the top eastwards the ground falls steeply to the river and is clothed in thickets. Here I have only seen *P. podalirius,* 2 or 3 together behaving in the same manner as on the Redoute; *V. atalanta* is there too, 2 or 3, also a few *P. megæra.* But this hilltop has no trees to the west so it is less sheltered from the wind than the others.

Ste. Barbe, the third hill, is about 200 m. alt., and stands quite alone above the plain. E.S.E of Bayonne it can be seen from a distance; also the view is extensive. Here I have seen greater numbers of butterflies than on the other two hills with the exception of *A. urticæ.* This hilltop is sheltered by trees to the north and west, and short grass covers the top. Great numbers of *P. megæra* are here, mostly on the ground or short grass, and the other three species fly around in the same fashion as they do on the Redoute.

One year I found great numbers of *Everes argiades* Pallas, all in a very poor condition; egg laying and mating in their case seemed to me a thing of the past; *E. argiades* is sedentary.

I once observed *P. machaon* trying to mate on the Redoute but I think that for all these species it is space, height, also perhaps on hot days the breeze may be some attraction, as it is for me! As to the sexes there are more ♂♂ than ♀♀ but the latter are present, and for the *Papilio* one ♀ to 5 or 6 ♂♂. I do not think that food, mating or laying has anything to do with their presence on the hilltops as this further note seems to show.

In the central Pyrenees there is one species, *Synchloe callidice* Esper, which haunts some of the very high summits in July. I have seen them more than once on mountain tops of 3000 m. alt. and over, and it is specially because of their behaviour in these high regions that I think it is height that the butterflies like when they go up to these summits and nothing else.

About the 10th of July in 1936 or 1937 I climbed the Pic Long, 3194 m. alt.; there had been a lot of snow that year and this rocky peak was completely draped in snow from about 150 m. below the summit to 1700 m. beneath it, and in many places lower. While I was resting on a bit of uncovered rock half way up the northern glacier, a *S. callidice* perched itself on my knee; it was a lady, too friendly to catch of course, and anyhow the net was in the sack! We left our sacks alas! on rocks about 150 m. beneath the summit and as we had nearly climbed to the top *S. callidice* whizzed past us. We counted about 15 to 20 *S. callidice* flying around that summit at their usual terrific pace. They came up from below, flew round and down again, there and gone in a second, never rested and were quite impossible to catch. Even with a net I doubt if we would have captured more than one or two as on every side of this very pointed summit the rock is almost perpendicular for at least 150 m. so we had to move with care. Amongst these butterflies there were 3 or 4 ♀♀; no signs of mating, nothing for them to feed on, not even a sign of a rock plant let alone any flowers. Their behaviour was that of pure "joie de vivre". These butterflies must have come from at least 1700 m. beneath the Pic Long and flown up over glacier and snow just to circle round the top; we were there two hours, and they were still at it when we left. Their behaviour on other high peaks is always the same, but it must be a sunny day with no wind or very little.

Aïce Choko, St. Jean-de-Luz, Basses Pyrénées, FRANCE

ARISTOTLE'S DESCRIPTION OF THE LIFE HISTORY OF A BUTTERFLY (PSYCHE)

THOSE (animals) called psyches develop from caterpillars which grow on green leaves, especially on those of rhaphanus, which some call cabbage; first they are less than grains of millet, then they grow into small grubs and in three (a few) days into little caterpillars; after this they grow more and then become quiescent and change their shape and are called chrysalides and have a hard shell; but they move if they are touched. They are attached (to a surface) by spider-silky filaments; they have no mouth or any other obvious organs; after no long passage of time the shell bursts open and out fly the winged creatures which we call psyches.

From a transcript by Professor C. D. GORDON (McGill University) of the passage in the Paris Edition (1887) of Aristotle's works. The words in the first and third parentheses have been interpolated for clarity; the other indicates that the Greek word *trisin,* three, may have been textually incorrect and should have been *tisin,* few.

Sir D'ARCY W. THOMPSON, who has given us a translation of Aristotle's *Historia Animalium,* thinks that the butterfly referred to was *Pieris brassicæ.*

P. H. H. GRAY, Box 236, Macdonald College, Que., CANADA

REVIEW

STUDIES ON THE COMPOUND EYES OF LEPIDOPTERA. 1. *ON THE COMPOUND EYES OF BUTTERFLIES, ESPECIALLY ON THE PSEUDOPUPIL AND ITS MEANING TO THE PHYLOGENY OF SPECIES;* 2. *ON THE MORPHOLOGY AND FUNCTION OF THE COMPOUND EYES OF HESPERIIDÆ.* By Nobumasa Yagi. *Journ. Faculty Textiles and Sericulture, Shinshu Univ.* (Ueda, Japan), vol. 1: pp. 131-173, 6 pls. (1951); no.3: pp. 29-41, 2 pls. (1953).

The view of Prof. YAGI is that the structure of the compound eye gives valid evidence for relationships of the various groups of the Lepidoptera, evidence comparable to that from the genitalia or wing-veins. He found that the "pseudopupil" visible in the eyes of living butterflies expresses the subsurface structure, but in the Hesperiidæ, Papilionidæ, and most Lycænidæ the pseudopupil is masked by pigment.

The eye of Hesperiidæ is reported to be very different from that of the true butterflies and from that known for moths; it is said to be similar to the eye of diurnal Sphingidæ. Structurally, the hesperiid eye is found to be of the superposition type found in nocturnal insects, in which light entering one ommatidium eventually stimulates receptors in adjacent ommatidia. But functionally the Skipper eye is said to be of the apposition type; the crystalline cone is pointed proximally, so that light passing through it is concentrated on the end of the rhabdome and does not pass to other ommatidia. Because of these distinctive features, YAGI believes the Skippers must be classified as a third suborder, "HETERHOPALOCERA", standing apart from the Heterocera and Rhopalocera. He rejects KIRI(KOFF'S view of close affinity with the Thyrididæ.

YAGI believes that "the origin of [a] group or species starts at first from the difference of [the] sense organ which perceive[s] the mate". Since species-recognition during courtship in butterflies seems to come largely from visual symbols, he supposes that the origin of species in butterflies begins with changes in eye structure!

C. L. REMINGTON, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

A PERMANENT METHOD OF LABELING SLIDES

In the preparation of genitalic slides in the past I have found that one of the hazards that presents itself occasionally is the loss of the data on a slide label or the loss of the label itself because of defective glue or some other accident. Recently Professor ELSO S. BARGHOORN of the Harvard University Herbarium has shown me a method by which the permanency of the labeling on a slide may be practically guaranteed.

First of all a thin solution of Damar or Balsam in Benzol is made. Since Damar and Balsam are very viscous a solution of the proper consistency will be one in which this viscosity has been greatly reduced so that the solution flows quite freely. A thin layer of this solution is then applied with a camel's hair brush to the portion of the slide to be labeled. After the painted portion has been allowed to dry for several minutes it can be written on with India Ink. I find this surface far superior to that of most commercial brands of paper slide labels for writing, since the ink will not run, and individual letters stand out with remarkable clarity.

The next part of the method is the one which insures the permanency of the label. It merely consists of painting the labeled portion of the slide with a varnish sold under the trade name of Tufon #74. This varnish is prepared by the Brooklyn Varnish Company, and its virtues, together with those of related compounds, are fully discussed in a paper by Professor BARGHOORN (*Science;* 106:299 1947). When the varnish had dried it forms a very hard coat that is impervious to the great majority of ordinary laboratory reagents. The one precaution that must be observed in using this varnish is to soak instruments which have been immersed in it in Xylol before it hardens. Once the varnish has become hard it is no longer soluble in Xylol and is exceedingly difficult to remove.

N.W. GILLHAM, Biological Labs., Harvard University, Cambridge 38, Mass., U.S.A.

RECENT LITERATURE ON LEPIDOPTERA

B. SYSTEMATICS AND NOMENCLATURE

Alberti, Burchard, "Die Deutung der Rösel-schen *Pyrgus*-Figur von 1746 (Lep. Hesperiidæ)" [in German]. *Nachrbl. Bayer. Ent.*, vol. 1: pp. 65-67. 15 Sept. 1952. *Pyrgus cirsii* Rbr.

Alberti, Burchard, "Die Deutung der Urabbildungen von *Pyrgus carthami* Hübner (Lep. Hesperiidæ)" [in German]. *Nachrbl. Bayer. Ent.*, vol. 2: pp. 37-40. 15 May 1953. In Hübner, *Sammlung europäischer Schmetterlinge,* Pap., t. 143 fig. 720 (726 ex err.) & 723, *Pyrgus carthami* Hb.; fig. 721 & 722, *P. cinaræ* Rbr. The type of the first species is probably from S. Russia; *möschleri* HS. is its aberration. [N.O.]

Boursin, Ch., "Eine neue Gattung der Unterfamilie Zenobiinæ aus dem Syr-Darja-Gebiet" [in German]. *Zeits. Wiener Ent. Ges.*, vol. 34: pp. 158-160, 1 pl. 31 Dec. 1949. Describes as new *MESOPLUS,* (type *Agrotis contrita*); figures ♂ genitalia, compared with those of *Turicina.* [P.B.]

Boursin, Ch., "Prof. Dr. M. Draudt, 'Beiträge zur Kenntnis der Agrotiden-Fauna Chinas. Aus dem Ausbeuten Dr. H. Hönes. (Beitrag zur Fauna Sinica)'. *Mitt. d. Münchn. Ent. Ges.*, XL, 1950, pp. 1-174, Taf. I-XVIII" [in German]. *Zeits. Wiener Ent. Ges.*, vol. 37: pp. 134-136. 15 Nov. 1952. Discusses the paper by Draudt and synonymizes some species. Discusses position of some other species and proposes *Blepharita draudti* n.n. for *Meganephria adusta* Drdt. (*nom. præoc.)*. [N.O.]

Boursin, Ch., "Zwei neue *Cryphia* Hb. (*Bryophila)* - Arten aus dem vorderasiatisch-mediterranen Faunenkreis. (Beiträge zur Kenntnis der 'Agrotidæ-Trifinæ' LV)" [in German.] *Zeits. Wiener Ent. Ges.*, vol. 37: pp. 152-155, 1 pl. 15 Dec. 1952. Describes as new *C. microphysa* (Prodromos, Cyprus, 1200 m.); *C. amseli* (Jericho, Palestine); figures adults and ♂ genitalia of these and related spp. [P.B.]

Bruun, Henrik, & Max von Schantz, "Till kännedom om *Brenthis improba* Btl. ssp. *improbula* Bryk (Lepid.)" [in Swedish, English summary]. *Notul. Ent.*, vol. 29: pp. 83-89, 1 pl., 3 figs., 1 map. March 1950. Demonstrates the differences in the genitalia between ssp. *improbula* and the nominate ssp. New localities for ssp. *improbula* in Finnish Lapland are recorded. Probable food plant *Salix herbacea.* The eggs are laid singly in the lichen cover. [W.H.]

Chiarelli de Gahan, Angelina, "El genero *Ariathisa* y su representante en la Argentina" [in Spanish]. *Comun. Inst. Nac. Cien. Nat. B. Aires, Cien. Zool.*, vol. 2: pp. 47-53, 1 pl., 10 figs. 1951. Transfers *A. nigrifrons* from *Proxenus;* redescribes sp., with figures of adults and structural details. [P.B.]

Cleu, H., "*Satyrus actæa aigoualensis* Foulquier dans les Cévennes médianes" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 171-172, 3 figs. "Jan/Feb." [31 May] 1952. Redescribes and figures subspecies.

Koch, Manfred, "*Horisme* Hb. (*Phibalapteryx* Stph.) *corticata* Tr. ssp. *bretschneideri* n. ssp." [in German]. *Zeitschr. Wiener Ent. Ges.*, vol. 33: pp. 43-44. 1 Oct. 1948. Type locality Dresden.

Kozhanchikov, I. V., *Fauna SSSR. Novaya Seriia.* 42. *Lepidoptera. XIII. Orgyidæ.* [in Russian]. 581 pp. Izv. Akad. Nauk SSSR, Moscow, 1950. [Not seen.]

de Laever, E., "*Cœnonympha iphis gallica* Rütimeyer" [in French]. *Rev. Franç. Lépid.*, vol. 13: p. 128, 1 pl. "Sept./Oct." [28 Dec.] 1951. Redescribes this race and figures a series. [P.B.]

Le Charles, L., "Contribution à l'étude des Zygènes *gallica-mana-erebus*" [in French]. *Rev. Franç. Lépid.*, vol. 13: pp. 287-297, 5 pls. "Oct./Nov./Dec. 1952" [25 March 1953]. Describes as new: *H. s. bierica* (Forêt de Fontainebleau); *H. s. aliosicola* (Gironde); *H. s. lemovica* (Haute-Vienne); *H. s. celtica* (Causse Noir, Camprieu): *H. s. antipolitanus* (Alpes-Maritimes); *H. s. pseudalliona* (Le Var); *H. s. pradensis* (Vernet-les-Bains). Type locality given only for *H. s. celtica.* Redescribes other races; figures series of several. [P.B.]

Le Marchand, S., "Quel est le véritable nom de *Neurothaumasia burdigalensis* Le Md. (Tineidæ) avec description d'une nouvelle espèce de *Tinea*" [in French]. *Rev. Franç. Lépid.*, vol. 14: pp. 41-45, 2 figs. 1953. *N. burdigalensis* is synonym of *Tinea ankerella.* A new species *Tinea manni* (without locality!) is described. [P.V.]

Lempke, B. J., "Catalogus der Nederlandse Macrolepidoptera XI" [in Dutch, with English descriptions of new subspp. and forms, and notes]. *Tijdschr. Ent.,* vol. 95: pp. 197-319, 8 figs. 20 Dec. 1952. In this last part of the catalogue concludes Geometridæ and describes as new *Peribatodes secundaria occidentaria* (pp. 233-234, fig. 53), *Aspitates ochrearia parvularia* (p. 265, fig. 55), and *Perconia strigillaria fuscosignaria* (p. 265, fig. 56), all from Holland; describes numerous new color forms; discusses history of the fauna of Netherland Lepidoptera (with English summary); gives addenda and errata to previous parts and an index to the whole work. Types of new forms not designated. [A.D.]

Lempke, B. J., "Catalogus der Nederlandse Macrolepidoptera. (Eerste supplement)" [in Dutch, with English discussions and descriptions]. *Tijdschr. Ent.,* vol. 96: pp. 239-305, 3 pls., figs. 30 Dec. 1953. Treats Hesperiidæ, Papilionidæ, and some Pieridæ. Describes as new *Aporia cratægi transiens* (Holland); describes numerous new forms. [A.D.]

de Lesse, H., "Contribution à l'étude du genre *Erebia* (7ᵉ note). *E. sthennyo* Grasl. est-il une bonne espèce" [in French]. *Rev. Franç. Lépid.,* vol. 13: pp. 217-219, 1 map. "March/April" [25 July] 1952. Species doubtfully distinct from *E. pandrose.* [P.B.]

Lingonblad, Birger, "Neue Schmetterlingsformen aus Lappland" [in German]. *Notul. Ent.,* vol. 26: pp. 69-71. Feb. 1947. Describes as new *Clossiana selene hyperborea* (northernmost Finnish Lapland), *Hesperia centaureæ grisea* (Finnish Lapland). Describes and names (!) aberrations of *Notodonta ziczac* and *Anomogyna gelida.* [W.H.]

Lingonblad, Birger, "Neue Schmetterlingsformen" [in German]. *Notul. Ent.,* vol. 29: pp. 79-82, 1 pl. March 1950. Describes as new *Erebia ligea petsamoënsis* (Petsamo in Russian Lapland), *Cœnonympha tullia muonioënsis* (Muonio area in Finnish Lapland). Describes and names aberrations of *Pieris napi, Palimpsestis ocularis, Coscinia cribraria.* [W.H.]

Löberbauer, Rudolf, "*Anomogyna rhætica* Stgr. ssp. *norica* nova subspecies" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 165-168, 1 pl. 15 Dec. 1952. Type locality Höllengebirge, Austria. [P.B.]

Paclt, Jiri, "Rectification of the nomenclature of *Colias* and *Ochlodes* (Lepidoptera)." *Ent. News,* vol. 62: pp. 305-307. 1951. Considers *Colias* feminine, *Ochlodes* neuter, in gender. [J.T.]

Pearson, Henry R., "Contribuçao ao conhecimento do gênero *Mimallo* Huebner, 1820 (Lepidoptera, Mimallonidæ)" [in Portuguese]. *Rev. Brasil. Biol.,* vol. 11: pp. 315-332, 57 figs. Sept. 1951. Describes as new: *M. neomilia* (Salesopolis, São Paulo, Brazil); *M. almeidai* (Angra dos Reis, Est. do Rio, Brazil). Redescribes *M. amilia* and *M. hector* and redefines genus. Figures adults and genitalia. [P.B.]

Pekarsky, Paul, "*Parnassius apollo* L. in den Karpaten" [In German]. *Zeits. Wiener Ent. Ges.,* vol. 38: pp. 106-110. 30 April 1953. Critical review of a paper by Issekutz (*Ann. Hist.-Nat. Mus. Hung.* vol. 2) on the same subject, correcting application of subspecies names. [P.B.]

Petersen, B., "The relations between *Pieris napi* L. and *Pieris bryoniæ* Ochs." *Trans. 9th Int. Congr. Ent.,* vol. 1: pp. 83-96, 2 figs. March 1953. Field observations in the Alps show that these two species are different biological species, isolated from each other by space (altitude) and time (of occurrence); possess also different foodplants; males have different odors. [A.D.]

Pring, R. W., & Patrick Roche, "The butterflies of Nigera. VI. Nymphalidæ: Nymphalinæ: *Cymothoe.*" *Nigerian Field,* vol. 17: pp. 53-66, 3 pls. Apr. 1952. Descriptions and keys to the 34 spp., 12 are figured. [P.B.]

Rebel, H., "Neue Heteroceren aus Aegypten" [in German]. *Zeitschr. Wiener Ent. Ges.,* vol. 32: pp. 49-60. 10 May 1948. Describes as new: (Lymantriidæ) *Orgyia ochrodorsalis* (Gebel Elba, Wadi Chab), *Polymona rubecscens* [sic!] (Gebel Elba, Wadi Cansisrob); (Agrotidæ) *Agrotis (Euxoa) pictifascia elbaënsis* (Gebel Elba, Wadi Aideb and Wadi Cansisrob), *Metopoceras eutychina* (St. Katrine), *Caradrina (Athetis) apicimaculata* (Gebel Elba, Wadi Cansisrob), *Cucullia macara* (Gebel Elba, Cansisrob), *Tarache seminigra* (Gebel Elba, Wadi Aideb), *T. grisescens* (Gebel Elba, Wadi Chab), *Ozarba cervina* (Gebel Elba, Wadi Aideb), *O. capreolana* (Gebel Elba, Mersa Halaib), *O. elaphina* (Gebel Elba, Wadi Aideb), *O. fuscescens* (Gebel Elba, Wadi Aideb and Cansisrob), *Eublemma tomentalis* (Gebel Elba, Wadi Aideb), *E. amydrosana* (Gebel Elba, Wadi Cansisrob and Wadi Chab), *PYRALOIDES, P. spodia* (Gebel Elba, Wadi Aideb),*Pseudocalpe anubis* (Gebel Elba, Wadi Aideb), *Rhynchodontodes sagittalis* (Gebel Elba, Wadi Rabdet); (Geometridæ)

Glossotrophia sinaica (Wadi Feran), *Cosymbia elbaensis* (Gebel Elba, Wadi Hekwal), *Traminda graciliata* (Gebebl Elba, Wadi Aideb), *Perizoma poliosana* (Gebel Elba, Wadi Cansisrob), *Zamarada latilimbata* (Gebel Elba, Wadi Aideb); (Nolidæ) *Nola priesneri* (Meadi, Cairo). No figures. [P.B.]

Varin, G., "Contribution à l'étude des Satyridæ de France, de l'Espagne et de l'Afrique du Nord. Les races d'*Arethusana arethusa* Schiffermiller (*sic!*) (*Satyrus, Eumenis* ou *Nytha arethusa*)" [in French]. *Rev. Franç. Lépid.*, vol. 14: pp. 77-84. "1953" [1954]. Study of the races of the satyrid *A. arethusa* in Spain, North Africa, and chiefly in France. The author describes three new races in France: *A. a. allobrogicus* (Isère area; no locality given for the paratypes); *A. a. calciphila* (Gard area); and *A. a. cerdanica* (E. Pyrenees; no exact locality given for the types). The presentation of this paper is rather defective. The name "race" and the names of the authors are in italics; the abbreviations for the same publication vary; the name Fruhstorfer is written in different ways; the citation "Rebel et Tierry, p. 80" is completely incomprehensible for the entomologist without knowledge of the literature of the Moroccan fauna (it is really the important paper of Zerny (1935, *Mém. Soc. Sci. Nat. Maroc.* no. 42: 163 pp., 2 pls. - not 1933 as it is written). Such a paper should never be published. [P.V.]

Varin, G., "Contribution à l'étude des Satyridæ (Lépidoptères). Les races d'*Hipparchia fidia* L. d'Afrique du Nord" [in French]. *Bull. Soc. Sci. Nat. Maroc,* vol. 33: pp. 69-74. 1954. Studies of the populations of the satyrid *H. fidia* in North Africa. Two new subspecies are described: *H. f. kandarica* (Djebel Abbad), and *H. f. Beni M'Guildi* (sic! - such a name should not be accepted) (Aïn-Leuh). The author's name Austant is really Austaut. Holotypes in author's collection. [P.V.]

Warren, B. C. S., "A new species of *Erebia* from S. E. Tibet (Lep. Satyridæ)". *Entomologist,* vol. 85: pp. 17-18. Jan. 1952. Describes as new *E. ludlowi* (Kongobo Do-Re). [P.B.]

Warren, B. C. S., "*Pyrgus reverdini* (Obth.): a European species." *Entomologist,* vol. 85: pp. 39-41. Feb. 1952. Describes as new *P. r. scotti* (type locality no specified, probably Sylkynjärvi, Finland). Species previously known only from Szechuan, China. [P.B.]

Wyatt, Colin W., "Einige neue Tagfalterformen aus Marokko" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 173-176, 4 pls. 15 Dec. 1952. Describes as new *Pieris manni haroldi* (Taghzeft Pass, middle Atlas, 1900m.); *Satyrus abdelkader taghzefti* (same, 1900-2100m.); *S. prieuri kebira* (same, 2200m.); *S. atlantis colini* (same, 2200m.); *S. arethusa aksouali* (Tachdirt, High Atlas. 2500m.); *Cœnonympha vaucheri annoceuri* (Annoceur, middle Atlas, 1600m.); figures adults of these and some related sspp. [P.B.]

Wyatt, Colin W., "Einige neue Tagfalterrassen aus Spanien" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 204-207, 1 pl. 31 Dec. 1952. Describes as new *Plebeius ramburi novarredondæ* (Novarredonda, Sierra de Gredos, Avila Province); *P. r. elsa* (Riano, Leon Province); *Cœnonympha leander trevincæ* (Peña Trevinca, Orense Province). Figures adults of new sspp. and of *P. r. ramburi; P. r. chapmani,* and *C. l. iphioides.* [P.B.]

C. MORPHOLOGY AND CYTOLOGY

Gray, P. H. H., "Correlations between "pupal volume" and wing-radius and weight in butterflies." *Lepid. News,* vol. 7: pp. 47-48. 27 July 1953.

Heikertinger, Franz, "Das Problem der 'Totalzeichnung' auf den Schmetterlingsflügeln" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 85-89, 147-153; vol. 35: pp. 68-80; 2 pls., 9 figs. 15 July, 31 Dec. 1949, 1 June 1950. Shows that markings of fore and hind wings tend to form a harmonious pattern when adjusted to the proper angle, which corresponds to some normal position of the living animal. Denies that this pattern is necessarily protective, since the same is true of the dorsal pattern in species in which the dorsal side is concealed at rest. [P.B.]

Kiriakoff, S. G., "Les organes tympaniques des lépidoptères comme caractère systématique et phylogénétique" [in French, English summary]. *Lepid. News,* vol. 6: pp. 7-12, 5 figs. 8 Aug. 1952.

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NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or to reject unsuitable notices. We cannot guarantee any notices but expect all to be *bona fide.*

Wish to contract immediately with museums, other institutions, and individuals to collect Lepidoptera and other insects and small animal life in the following regions: South and Central America; Mexico, Cuba, Southern Florida; Hawaii; Africa; Alaska. Larry J. Kopp, R.D., Klingerstown, Penna., U.S.A.

Will send a copy of my annotated check list of the hundred butterflies of the Oglethorpe University campus in Georgia to anyone sufficiently interested to send a large self-addressed envelope and 9¢ postage to John P. Knudsen, 120 So. Boundary St., Chapel Hill, N. Car., U.S.A.

Wanted: perfect specimens of ♂ ♀ of *Triodes alexandræ* from New Guinea. I will purchase if price is reasonable. Also desire *Agrias* from South America, single specimens ♂ ♀ of the yellow and blue varieties. A.J. Carpenter, 236 Huntington Ave., Boston, Mass., U.S.A.

Wanted for cash: specimens, with full data, of *Strymon falcer, S. edwardsii, Phyciodes batesii, Polygonia faunus, Asterocampa flora, Melitæa harrisi,* and *Enodia creola.* No exchanges. Roderick R. Irwin, 411 North Bloomington St., Streator, Illinois, U.S.A.

Wish to sell lot of 200 Lepidoptera, mostly Rhopalocera, from France, Switzerland, and Spain, left by deceased friend. Priced at $10.00, cost to me. Alex K. Wyatt, 5842 N. Kirby Ave., Chicago 30, Ill., U. S. A.

Wish to buy large quantities of colorful butterflies from all parts of the world, for artistic displays. Gordon R. Steinhoff, 3916 Oak St., Burbank, Calif., U. S. A.

Wanted: *Troides* (=*Ornithoptera*) of all kinds, *Papilio antimachus,* and other *Papilio* from Africa, India, and Indoaustralia; please send list and prices. All kinds of Illinois butterflies for exchange. Karl E. Karalus, 10411 Diversey, Melrose Park, Ill., U. S. A.

LIVING MATERIAL

LIVING PUPAE OF *PAPILIO RUTULUS, MULTICAUDATUS, EURYMEDON* urgently needed for research purposes; will purchase or exchange. Lincoln P. Brower, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

California moths and butterflies for sale, papered, pinned to suit. Many pupæ available. Inquiry invited. F.P. Sala, 1912 Hilton Drive, Burbank, California, U.S.A.

To all those who received my questionnaires for the checklist on Florida Lepidoptera: please send in all information by Feb. 1, 1955. Anyone else having information on Florida Lepidoptera, please write me for questionnaire. Charles P. Kimball, Route 4, Box 942, Sarasota, Florida.

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By action of the Executive Council the dues, beginning with 1955, will be $4.00 for Regular Members, $10.00 for Sustaining Members, and (beginning with publication of this issue) $75.00 for Life Members. This step was taken with great reluctance after two years of large deficits and the certainty of a third for 1954, in spite of careful attention to economies. If the number of Sustaining Members remains near its present fine level, it may be possible to increase moderately the annual number of pages of the *News*.

Reprints of the following papers are available from the *News* editor, gratis to Society members (members in the U. S. A. (only) please send at least 5¢ in postage stamps to cover mailing costs).

C. Börner, "Ordn. Lepidoptera" (from *Fauna von Deutschland;* 1953)

P. R. Ehrlich, " A new subspecies of *Erebia epipsodia*" *(Ent. News;* 1952)

P. R. Ehrlich & N. W. Gillham, "A new *Atrytone* from Nebraska" *(Ent. News.* 1951)

W. D. Field, "The correct name for the N. Am. butterfly ...... *Calephelis* or *Lephelisca*" (1948)

W. D. Field, *et al,* Nomenclature of Monarch butterfly (1950, 1951)

E. C. Johnston, "Lepidoptera of the Pribilof Is., Alaska" (*Lepid. News;* 1950)

F. M. Jones, "The sleeping Heliconias of Florida" (*Nat'l History;* 1930)

F. M. Jones, "Pitcher Plants and their moths" (*Nat'l History;* 1921)

A. B. Klots, "Notes on the genus *Eurema* in the U.S.A." (*Lepid. News;* 1948)

H. B. Leech, "Flights of *Nymphalis californica* ...... in 1945" (Can. Ent.; 1945)

R. R. McElvare, "An approach to specializing" (*Bull. Brooklyn Ent. Soc.;* 1952)

R. R. McElvare, "A new *Grotella* from S. W. Texas." (*Ibid.;* 1950)

G. W. Rawson & S. A. Hessel, "Life History of *Strymon cecrops*" (*Bull. Brooklyn Ent. Soc.;* 1951)

F. Richard (transl.), "How to make ♀ Rhopalocera lay eggs" (*Lepid. News;* 1948)

S. L. de la Torre y Callejas, "A new butterfly (*Anæa*) from Cuba" (*Proc. Ent. Soc. Wash.;* 1951)

L. J. Toxopeus, "Notes on the genus *Amathusia*" (*O. S. R. Publ.* 34; after 1942?)

C. L. Remington

The object of The Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (*Constitution,* Art. II). A special goal is to encourage free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. All other correspondence concerning membership and general Society business should be addressed to the Secretary. Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

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Each year a list of members of the Society is published in the *News,* with addresses and special interests.

All members are expected to vote for officers when mail ballots are distributed by the Secretary each year.

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In This Issue

LIFE HISTORY OF A RARE *MEGATHYMUS*

INHERITANCE OF *COLIAS* DISCAL SPOT COLOR

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(Complete contents on back cover)

7 January 1955

NOTICE TO CONTRIBUTORS TO THE *NEWS*

Contributions to *The Lepidopterists' News* may be on any aspect of the study and collection of Lepidoptera in any part of the world. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (*e.g.,* wing venation, mimicry, moth traps); 2) papers on pre-adult stages, genetics, comparative taxonomy (descriptions of new species and subspecies will be accepted); 3) field notes of more than a very local nature; 4) notes on well-tested techniques. Papers of more than ten pages will not normally be accepted.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed. Use only one side of the paper. The author should keep a carbon copy of the manuscript.

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Ordinarily, manuscripts should be in English. However, the editors will attempt to translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages with roman letters are always welcomed at the end of any paper.

Titles must be kept as short as possible; Latin names of genera and species will be italicized, and authors of such Latin names WILL NOT APPEAR IN THE TITLE of any paper but must appear once in the text. THE STYLE SHOULD CONFORM TO THAT USED IN RECENT ISSUES OF THE *NEWS.* Footnotes should be kept at a minimum. The editors reserve the right to adjust style to fit standards of uniformity.

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THE LEPIDOPTERISTS' NEWS

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AN ACCOUNT OF THE UNUSUAL LIFE HISTORY OF A RARE YUCCA SKIPPER (MEGATHYMIDÆ)

by LUCIEN HARRIS, JR.

Collecting butterflies with a shovel! That sounds fantastic, but before the life history of the very rare skipper *Megathymus cofaqui* Strecker was solved, a shovel became standard equipment in addition to the usual butterfly net. The adult butterflies are so rare that in order to get a series it became necessary to use a shovel to dig up the caterpillars from the roots of the yucca plant.

Megathymus cofaqui was named by HERMAN STRECKER in 1876 from a single specimen collected in Georgia by H. K. MORRISON. STRECKER failed to record the locality or the date of capture. The lack of these two important data has added to the difficulty of this investigation, for it now appears that there are either two forms of this Skipper, one of which flies on the upper half or Piedmont region of Georgia in July and August, and the other one flying in Florida and perhaps on the Coastal Plain of Georgia in March and April, or else a new but closely allied species has been discovered.

A comparison of a recently captured northern Georgia specimen was made with the original type specimen at the Chicago Natural History Museum by the Curator, R. L. WENZEL. His report shows that the upper side of STRECKER'S type specimen is distinctly lighter brown than the northern Georgia specimen. The underside was lighter throughout in the type specimen (color distinctly brown), with the same distribution of blue gray scales that occurs in the northern Georgia specimen.

A photograph of the original type specimen was also supplied through the courtesy of the Chicago Natural History Museum (see Plate 1). When it was compared with a series of specimens from northern Georgia and Sarasota, Florida, the Florida specimens compared most closely. This would not be surprising if the type was collected on the Coastal Plain of Georgia. The Georgia Coastal Plain extends in a broad belt from Augusta to Savannah and thence to the Florida state line on the south, and westward to the Alabama state line taking in the territory between Columbus, Georgia, and the Florida state line.

In several other species of butterflies there is a Coastal Plain form that differs from the one that flies in the Piedmont region. MORRISON, like many other collectors, may have collected briefly in the Georgia Coastal Plain when he

traveled to or from Florida. Nearly every collector of North American butterflies cherishes the hope that someday he can make a special collecting trip to Florida, where a number of species abound that are not to be found elsewhere.

My special interest in *M. cofaqui* began on July 9, 1950, when my son, LUCIEN HARRIS, III, caught what appeared to be a fresh male in the edge of the woods at the base of Stone Mountain. This spectacular granite mountain is located 16 miles east of Atlanta, Georgia, on U.S. Highway #78. At the time of the capture we wondered why it seemed to be flying so late in the year, for the few references to this skipper in books usually gave March and April as the flight period. Our guess at that time was that this particular specimen had remained in its pupal case several months past its normal emergence time. Later developments proved how wrong we were!

A year later, when looking at the collection of Prof. J. P. KNUDSEN, then at Oglethorpe University, near Atlanta, I saw a female *M. cofaqui* which he had captured near Cleveland, Georgia, on August 16, 1942. This record and LUCIEN'S July record gave me the first real clue that July and August were the flight months of *M. cofaqui* or a closely related species in the Piedmont region instead of March and April. No wonder it was rare in collections!

KNUDSEN recalled having seen a few yucca plants on the roadside when he caught the skipper. The butterfly is not easy to catch, for it has a rapid, undulating, zig-zag flight. On July 9, 1952, almost ten years after KNUDSEN had caught his specimen, I visited the area and located the yucca plants. They were *Yucca filamentosa,* which is the same species that grows on Stone Mountain. The local name for this plant is Bear Grass. This plant also occurs in Florida in favorable localities where its local name is Adam's Needle, according to BAKER'S *Florida Wild Flowers.*

Bear Grass is a low-growing plant with no trunk. From the root-base on the ground its sharp, stiff leaves point upward and outward like green bayonets. At certain times of the year, especially in the summer, there are curly threads or filaments along the edge of the leaves, which give the plant its scientific name. In addition to being found in sandy soil it often occurs in the gravelly soil on large granite outcroppings in the Piedmont region. Also in recent years this yucca plant has become established in favorable places on the well drained shoulders of highways in most of the southeastern states.

When I first searched for the larva of *M. cofaqui* on the yucca plants near Cleveland, I looked for a silk cocoon-like pouch. It seemed likely that the larva would protect itself with a silk covering over its tunnel like other species of this group. I was familiar with the brown, cigar-shaped pouch which the larva of the other Yucca Skipper of Georgia, *Megathymus yuccæ,* constructs in the center of the plant, sticking up a few inches like the thumb of a brown glove. After a diligent search both in and around the plants I discovered the secret of *M. cofaqui.* Instead of constructing or creating the cocoon-like pouch in the center of the plant, it had erected one

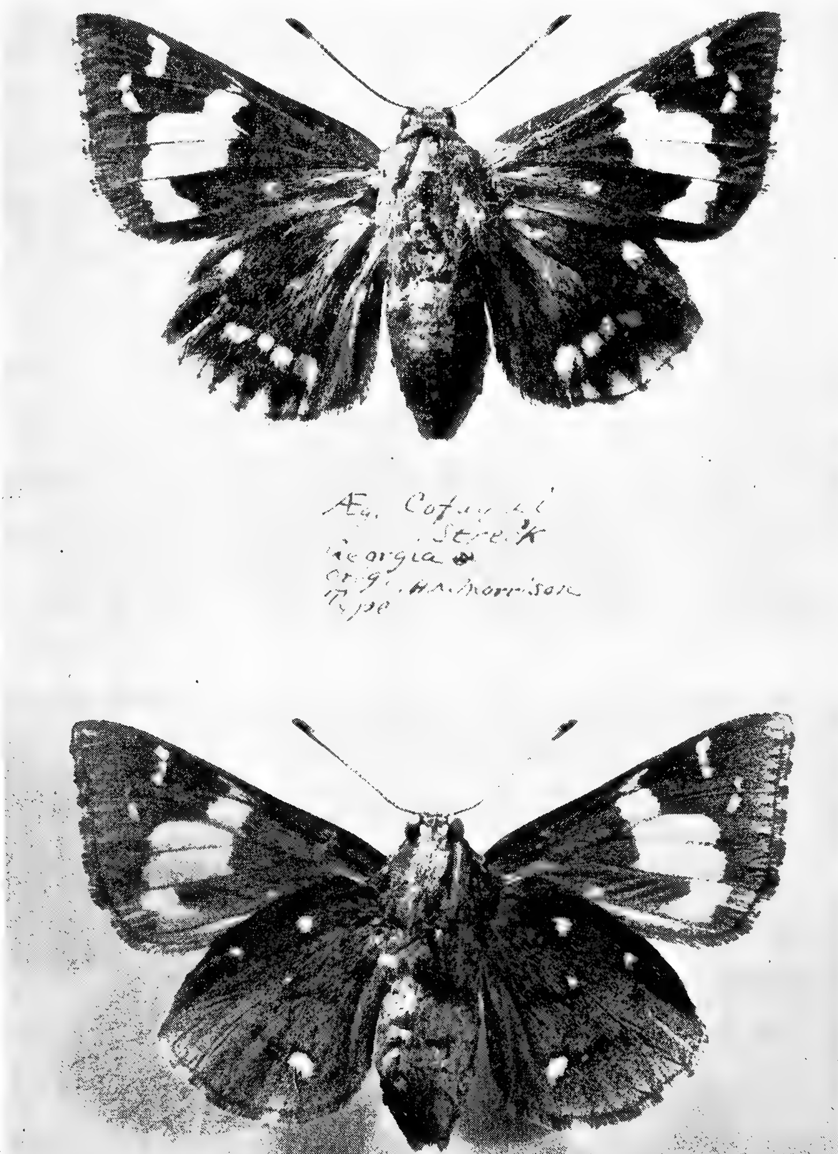
on the ground a few inches away from the base of the plant. It was hidden from view by the lower leaves of the plant (see Plate 3). A silk-lined underground tunnel connected the silk pouch with the yucca root where the larva had lived and fed for almost a year. This pouch was not constructed above the surface of the ground until the larva had become full grown and was almost ready to undergo the transformation to a pupa. When the larva is ready to pupate it crawls into the base of the pouch just below the surface of the ground and sheds its skin. The pouch now serves as a cocoon for the pupa. However, the pupa can be extremely active, and when the cocoon is disturbed the pupa will retreat down into the root tunnel (see Plate 3). After remaining as a pupa from two to six weeks, the butterfly emerges and crawls out through a hole made at the top of the pouch. This usually takes place between sunrise and 10 A.M. Its wings expand rapidly, and it is ready to fly in three hours.

The cocoon-like pouches are difficult to find because they blend so well with their surroundings. The silk is somewhat sticky when the pouch is first made by the larva, and it often becomes coated with soil, gravel, or leaves that effectively camouflage it. This gives the pouch of *M. cofaqui* an entirely different appearance from that of *M. yuccæ* (see Plate 3). The latter creates its pouch above the ground, up in the center of the plant, where it is out of contact with the soil. It is light brown when first constructed, usually turning dark brown with age.

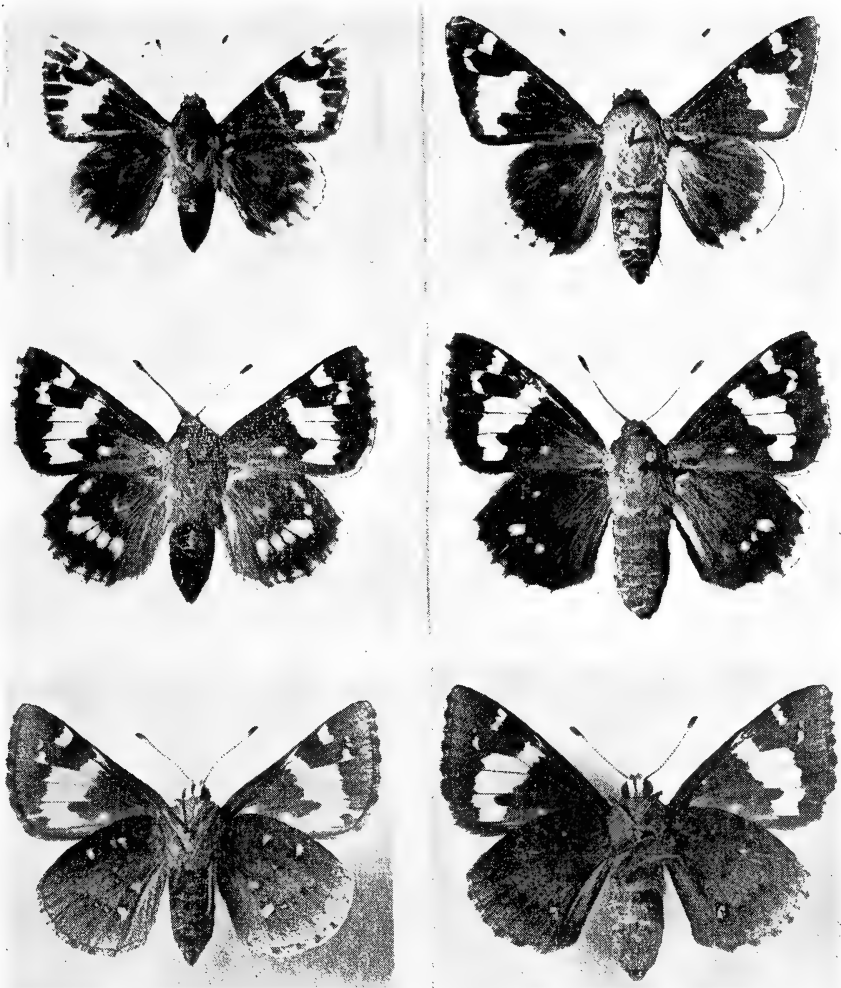
The trip to Cleveland, Georgia, on July 9, 1952, yielded six of the "tents", as these tubular silk pouches are sometimes called. Three of them contained one pupa each, one contained a larva, and two contained empty pupal skins from which the Skippers had already emerged. The first Skipper to emerge appeared on July 21, and the others followed in a few days, the last one emerging on August 10. A second trip was made on July 12, and two more "tents" were found. One contained a larva and one a pupa. The larva transformed into a pupa on July 15, and a female *M. cofaqui* emerged on August 6.

On August 20, the final trip in 1952 was made to the area, and one more "tent" was found. The larva was injured while being dug out with the shovel. It died a few days later. I dissected it and saw that it had been parasitized, having been infected with a multitude of minute grubs. Previously I had detected a similar parasite in the larva of *M. yuccæ.*

The first larva, collected July 9, was two inches long and cream colored. It had a small black head that could be withdrawn into the first segment. In general, it resembled the larva of *M. yuccæ* except that the *M. cofaqui* larva was somewhat smaller. This larva changed to a pupa on July 19. The pupa was one-and-three-fourths inches long and three-eighths of an inch in diameter. At first it was creamy white, but it soon began to darken at its head, and in a few days it was dark for three-fourths of its length. The pupa was very active and could wriggle up and down at will in its silk-lined tunnel. Usually it stayed up in the "tent" unless disturbed; then it would quickly wriggle down into the root tunnel.



Megathymus cofaqui Strecker, holotype female. Upperside above, underside below. (Photo courtesy of Chicago Natural History Museum)



Megathymus cofaqui: left row Sarasota, Florida, 15-17 March 1953; right row Stone Mountain, Georgia, 17-23 July 1953. Upper row males, upperside; middle row females, upperside; lower row same females, underside. (Photos by CAROLYN CARTER)

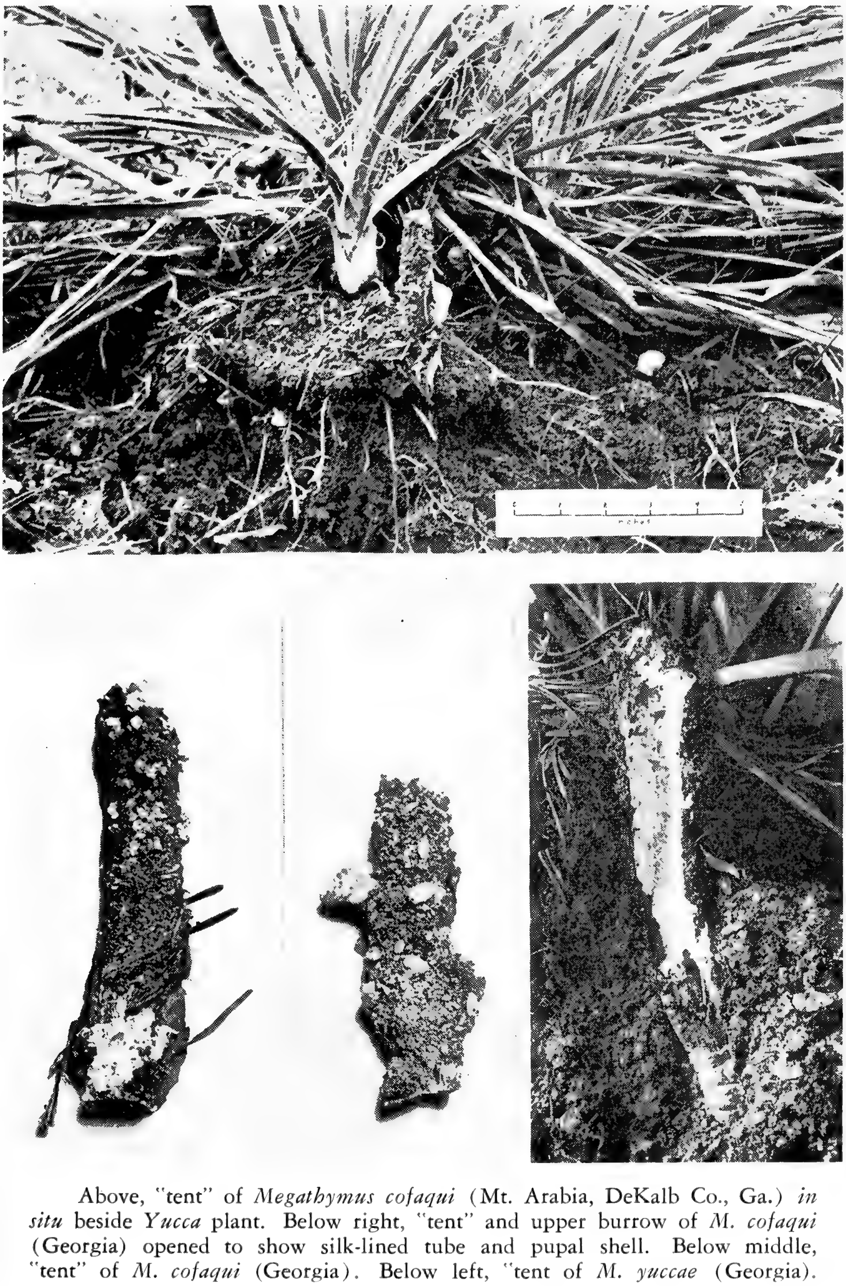
Since LUCIEN HARRIS, III, had collected a specimen of *M. cofaqui* at the base of Stone Mountain, a search was made on August 2, 1952, for "tents" on the ground among the yucca plants at the foot of the mountain. Three "tents" were found, but they contained empty pupal cases. Professor KNUDSEN examined the leaves of one plant under which we had found a "tent" and discovered an egg near the center of a leaf. Further search revealed three more eggs on other leaves. He took them home for further study. He later reported that the egg is smooth, nearly hemispherical and about as high as wide. At the time the egg was first collected its color was pale pink. One week before hatching, the egg is a pale rose purple, lightest at the base and shading to a deep tone at the apex. As hatching time approaches, the egg loses the purple cast and becomes white with a dark micropyle. The larval head can be seen through the shell as a gray area within the egg. The first larva emerged August 10, 1952.

At hatching time the larva leaves the egg through a roughly circular hole 1 mm. in diameter chewed at the apex of the egg. On emergence the larva is about 6 mm. long. The remainder of the shell is not eaten, and the young caterpillar crawls immediately to the base of the leaf where it conceals itself in the crown of the plant. A little later it gradually begins to eat its way into the main root of the plant.

The head is a deep brown, almost black, slightly clothed with short hairs. It is about 1 mm. in width. The first thoracic segment is dorsally armored with a shell of horny material against which the head can be tightly drawn. The larva's body is a warm orange brown, faintly flecked with black at the base of the short unbranched hairs with which the larva is sparsely clothed. From six to ten hairs are found on each segment, those segments toward the rear bearing the longest hairs.

On September 11, 1952, Professor KNUDSEN and I went to Macon, Georgia, to collect butterflies. While crossing a railroad embankment, covered with rather dense brush about knee-deep, the professor kicked a yucca plant, and an *M. cofaqui* fluttered out. His net was popped over it, but instead of flying upward into the net the butterfly dropped through the thick underbrush to the ground and eluded us. This late summer record is important, for Macon is on the "fall line" which marks the end of the Piedmont region and the beginning of the Coastal region. The "fall line" extends across Georgia from Augusta through Macon to Columbus. Macon is close to the geographic center of the State.

KNUDSEN'S record, together with a specimen captured in Macon by Dr. H. F. STROHECKER one summer, which is in my collection, establishes the fact that even in middle Georgia the *M. cofaqui* is on the wing during the summer months. The writer would like to receive information from anyone having specimens taken on the Coastal Plain of Georgia, as date and locality of captures in this area are greatly needed. At the present writing we do not have any records for this area. As pointed out earlier in this article the flight period in the Piedmont region of Georgia is quite different from the March and April flight period in Florida. The Coastal Plain of Georgia



Above, "tent" of *Megathymus cofaqui* (Mt. Arabia, DeKalb Co., Ga.) *in situ* beside *Yucca* plant. Below right, "tent" and upper burrow of *M. cofaqui* (Georgia) opened to show silk-lined tube and pupal shell. Below middle, "tent" of *M. cofaqui* (Georgia). Below left, "tent of *M. yuccae* (Georgia). (Upper photo by C. L. REMINGTON; others by CAROLYN CARTER)

may someday provide the answers that will bridge the gap between the two populations or show that they are distinct species.

My first bit of information about the life history of *M. cofaqui* in Florida came from Dr. AUBURN E. BROWER of Augusta, Maine. He wrote that there was very little information about *Megathymus cofaqui* but that an observer in Florida, J. G. BONIWELL, had referred to it in 1917 in an article in *Lepidoptera* (vol. 2: pp. 108-109). BONIWELL'S report dealt with *Megathymus yuccæ* (Boisduval) but referred to *M. cofaqui* briefly in three lines as follows: "Some experiments with the larvæ of *Megathymus cofaqui* the year before had convinced us that it had habits quite a lot different from its near kin *yuccæ.* This year we succeeded in determining without any doubt the fact that the *cofaqui* does not make a silken pouch in the summer or fall like the *yuccæ,* but remains entirely concealed until about two weeks prior to pupation, at which time it penetrates the surface and creates a short light-colored pouch, usually near the ground on rotten prostrate stems. We have yet to find a *cofaqui* in a strong healthy plant."

It should be pointed out that the *M. cofaqui* larvæ studied by BONIWELL were in Spanish Bayonet which is the tall yucca plant of the coastal sand dunes and is different from the low growing Bear Grass or Adam's Needle of the inland country and highlands. Spanish Bayonet (*Yucca aloifolia*) has a trunk two to ten feet tall with several branches, and the entire plant is covered with rigid, sharp-pointed leaves one to three feet in length. It is tree-like in comparison with Bear Grass (*Yucca filamentosa*) which has no trunk. Unfortunately, BONIWELL did not state the exact time of year that *M. cofaqui* larvæ under study penetrated the surface and created the pouch, but he did state that it did not make a silken pouch in the summer or fall. This leaves the winter and spring as possibilities which he further narrowed down with the statement, "but remains entirely concealed until about two weeks prior to pupation, at which time it penetrates the surface and creates a short light-colored pouch . . ."

Through the courtesy of Dr. A. B. KLOTS of the American Museum of Natural History, the dates of capture of their Florida specimens were given to me. They ranged from March 1 to May 11 with 9 specimens having been taken in March, 4 in April and 1 in May. These dates proved without a doubt that the Florida *M. cofaqui* flies in the early spring.

Dr. KLOTS also supplied me with the names of H. L. KING and CHARLES P. KIMBALL, both of whom had recently taken *M. cofaqui* near Sarasota. KIMBALL reported the interesting and unusual capture of a fresh female on November 22, 1952. While this date seems to be as out of season as the unexpected capture of a male on July 9, 1950, by LUCIEN III, or KNUDSEN'S capture of a female on August 10, 1942, it is likely that KIMBALL'S November 22 date will fit into its proper place, too, when the entire life cycle is known.

H. L. KING reported the capture of several specimens of *M. cofaqui* near Sarasota during the period from March 23 to March 30, 1952. On March 1, 1953, he caught a fresh specimen and invited me to visit him and look for "tents". The butterflies were still on the wing when I visited the lo-

cality with KING and KNUDSEN on March 15. KING had found this small colony in a group of Spanish Bayonets on the edge of the Gulf.

We were anxious to discover where and how *M. cofaqui* constructs its "tents" when the food plant is the tall Spanish Bayonet instead of the low growing Bear Grass. After we had all spent some time carefully searching for "tents", KNUDSEN found two on the ground at the base of a rather small plant. They would not have been visible to the casual observer, for they were completely hidden from view by the dead leaves hanging downward from the lower part of the stalk. These "tents" resembled the ones that we had found in northern Georgia in July but were shorter and lighter in color. Unlike the Georgia ones they were not coated on the outside with sand or other material. The "tent" was yellowish in color and stood out in contrast to the white sand on which it had been erected. The "tent" was connected with the root of the plant by a silk-lined tunnel. After a diligent search we each found two or three "tents" on the ground well-hidden at the base of yucca plants.

The second important discovery was made by KING. He was examining the dead leaves on a yucca stalk and found a "tent" on the stalk about six inches above the ground. This confirmed BONIWELL'S observation on this point. We concluded that the caterpillar usually erects its "tent" on the ground, but when circumstances are not favorable it will place it on the stalk as near the ground as possible. In February 1954 the area was again visited and several "tents" were found. They were located on the base of the plants at or slightly above ground level on the stalk.

The colony which we were studying was located on the edge of the Gulf of Mexico. Sometimes when the skippers were accidently flushed from their hiding places in the underbrush they would fly out over the water and then circle back to the land. Although the flight was fast and erratic it was sustained for only a brief time.

This colony flourished in an area about two acres in extent where the Spanish Bayonets were not as strong and vigorous as they were in nearby areas where no skippers were found. BONIWELL had previously noted that he had not found *M. cofaqui* larvæ in strong healthy plants. It would be difficult to decide whether the condition of the plants was due to the infestation by the *M. cofaqui* larvæ or to other causes. We noted that another type of larva apparently the grub of a large beetle, was also burrowing in the stalk of these plants. Other factors may have been involved that prevented these plants from being strong and vigorous.

The adult Skippers which we captured were smaller and browner than the ones taken in northern Georgia. The Florida specimens varied greatly in size. They compared with Georgia specimens (see Plate 2), as follows:

Florida males, wing expanse 1-3/4 inches to 2-1/4 inches
Georgia males, wing expanse 2-1/4 inches to 2-6/16 inches
Florida females, wing expanse 1-6/16 inches to 2-6/16 inches
Georgia females, wing expanse 2-1/4 inches to 2-6/16 inches
STRECKER'S original type female, wing expanse 2-3/16 inches.

Adult specimens collected in the field did not vary noticeably in size or color from the specimens that emerged from collected pupæ.

Another very noticeable difference between the northern Georgia and Florida specimens, in addition to the much lighter brown color of those from Florida, is the greater width of a band of yellow markings on the upper side of the hindwings of the Florida females. This band of spots varies from a fairly narrow row to a rather wide band, while on Georgia specimens there is a row of three or four rather small spots instead of a band. These spots are rather constant in size on all of the female Piedmont region specimens that I have examined. On the underside of the hindwings of the Florida females there are light spots which correspond with the ones on Strecker's female type, whereas northern Georgia females consistently have fewer spots (see Plate 2).

A trip to the spot on the highway near Cleveland, Georgia, was made on July 1, 1953. It proved disappointing, for the highway department had worked over the area, and many of the plants were buried or destroyed when the shoulder of the road was graded. Not a single "tent" could be found. A similar trip was made on July 28, 1954, with the same results.

A visit was made on July 3, 1953, to the Stone Mountain area. Nine "tents" were located. Each contained a pupa. It was difficult to dig the root tunnel and "tent" out of the rocky locations, but this was finally accomplished with a stout shovel. The first skipper emerged on July 5, and others followed at intervals of a few days. The last one emerged on July 26, 1953. Another visit was made to the Stone Mountain area on June 30, 1954. Three pupæ were dug up, but two died from injuries. A female skipper emerged on July 10, 1954, from the third pupa.

While I was searching the Stone Mountain area for "tents", a large female *M. cofaqui* flew out of a cluster of yucca plants. I swung my net but missed it and was glad that it escaped, for it represented generations yet to be born of a rare species that had given me the pleasure of exploring both mountains and seashore in an attempt to solve its life-history secrets.

P.O. Box 167, Avondale Estates, Ga., U.S.A.

[Editor's note: Since this manuscript was accepted, it has been learned that there are in fact two species in Mr. HARRIS'S material, one of which is being described as new (in press) by H. A. FREEMAN.—C. L. R.]

ON MARKED AND RELEASED MONARCHS

Any individual who has marked Monarchs (*Danaus plexippus*) in North America this year is urged to communicate immediately with the *News* Editor. A clearly marked specimen was caught in Ohio in October. In addition to those released by C. A. ANDERSON of Dallas, Texas, we know of 36 marked near Washington, D. C., by JOHN H. FALES, from 1 to 17 October. Mr. FALES also marked one *Vanessa cardui* and one *Phœbis sennæ eubule* before releasing them.

C. L. REMINGTON

THE INHERITANCE OF HINDWING DISCAL SPOT COLOR IN *COLIAS PHILODICE*

by CHARLES L. REMINGTON

Instances of sustained conspicuous variation among the individuals of a single interbreeding population are of special interest to evolutionary biologists. FORD (1953) has recently reviewed the state of knowledge of this "balanced polymorphism" in the Lepidoptera. The conspicuous variability in species of the genus *Colias*, especially in North America, is familiar to butterfly collectors but has been confusing and often controversial. Some of the sympatric variation in *Colias* is due to natural interspecific hybridization or to environmental effects, but there are certain characters which vary within each species and which are controlled by one or a few pairs of genes. The most familiar is the ground-color of the female, in which the "alba" form is produced by a dominant sex-limited gene and colored females are homozygous for the recessive allele. I have summarized our knowledge of genes and polymorphism in *Colias* elsewhere (Remington, 1954).

The color of the discal spot on the upperside of the hindwing has received very little attention, although its great variability in some species has been known for a long time. Every species of *Colias* and its near relative *Zerene* has the hindwing discal spot. In the orange species it is rather uniformly orange or orange-red except in "alba" females, where polymorphism is then visible (*e.g., C. eurytheme* Bdv. and *C. lesbia* Fab.). Some yellow species have the spot consistently pale yellow (*e.g., C. palæno* L.) or occasionally have an orange-tinted spot (*C. alexandra* Edw., *C. scudderi* Reak., *C. behrii* Edw.). However, *C. philodice* Latr. and some other yellow species show marked polymorphism in most or all populations; individuals having the spot pale yellow fly with others having the spot deep orange, and the intermediate grades of color occur at the same time.

During our studies at Yale of *Colias* genetics, we have reared a number of broods of *C. philodice* from Connecticut which give some evidence of the inheritance of the color of the spot. The arrival of the J. H. GEROULD COLLECTION at Yale has permitted the analysis of additional broods of *C. philodice* from New Hampshire. These are included in the table. Other work made it not feasible to take the time required to make a photometric analysis with precise instruments, and an arbitrary color standard was established, with an index series of specimens for frequent reference. The palest spot, with no orange or red scales, was designated "yellow." The reddest spot (near "Orange Chrome" of Ridgway, 1912) was called "orange." Three evenly spaced grades between "yellow" and "orange" were designated "pale semi-orange," "semi-orange," and "deep semi-orange."

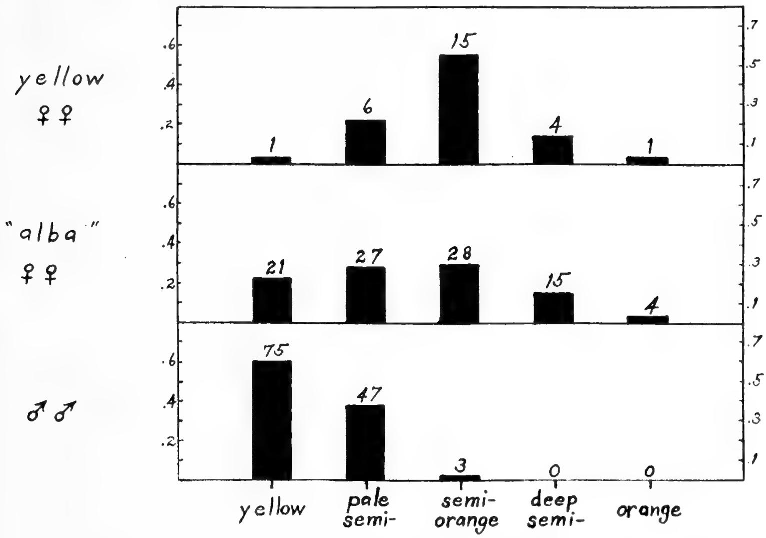
One of the first discoveries was the difference between the spot colors in males, "alba" females, and yellow females. The figure shows graphically the fact that the discal spot is much paler in males than in females having es-

Table of hindwing discal spot color in Connecticut (58 to 75A-D) and New Hampshire (1909a to 1920ι) broods of *Colias philodice.**

Brood No.	♀ Parent	♂ Parent	F₁ Offspring: yellow	pale semi-	semi-orange	deep semi-	orange
58	*aa* deep semi-	? (wild)	0-0-0	4-0-1	15-0-25	4-0-7	0-0-0
58H	*aa* semi-or.	semi-or.	0-0-0	1-0-0	7-0-2	0-0-0	0-0-0
62C	*aa* orange	pale semi-	0-0-0	2-0-0	11-0-4	0-0-3	0-0-0
70B	*aa* semi-or.	yellow	4-0-0	2-0-1	0-0-1	0-0-0	0-0-0
70B-A	*aa* pale semi-	pale semi-	5-0-0	5-2-3	2-7-5	1-0-5	0-0-0
75A	*Aa* pale semi-	same ♂ (70B-A)	12-1-0	1-3-2	13-9-11	1-0-5	0-0-0
75A-C	*Aa* semi-or.	yellow	9-0-0	0-3-1	0-2-4	0-0-0	0-0-0
75A-D	*aa* semi-or.	semi-or.	0-0-0	2-0-0	3-0-3	1-0-0	0-0-0
1909a	*Aa* semi-or.	? (wild)	5-0-0	21-3-2	10-3-9	0-0-4	0-0-0
1909w	*Aa* deep semi-	semi-or.	0-0-0	6-3-1	10-2-1	1-2-0	0-0-0
1910g	*Aa* semi-or.	? (wild)	52-14-6	4-11-10	0-7-4	0-3-1	1-0-0
1910i	*aa* (lost)	yellow	27-16-6	2-13-6	0-2-2	0-0-0	0-0-0
1910k	*aa* semi-or.	yellow	29-6-3	4-4-5	0-5-7	0-1-0	0-0-0
1910b	*Aa* deep semi-	? (wild)	4-0-0	18-4-2	42-13-15	7-4-5	0-0-0
1910o	*Aa* semi-or.	semi-or.	0-0-0	2-1-0	4-2-3	1-0-1	0-0-0
1910e	*aa* deep semi-	pale semi-	7-3-2	35-4-6	12-4-4	0-0-1	0-0-0
1910f	*aa* semi-or.	pale semi-	1-2-0	8-2-2	1-3-3	0-0-0	0-0-0
1920ι	*Aa* semi-or.	pale semi-	75-21-1	47-27-6	3-28-15	0-15-4	0-4-1

*Hyphenated figures show in order the number of ♂♂, of "alba" ♀♀, and of yellow (*aa*) ♀♀; thus, Brood 1910g produced 52 ♂♂, 14 "alba" ♀♀, 6 yellow ♀♀ with the discal spot yellow. *Aa* = "alba"; *aa* = yellow ♀.

sentially the same autosomal genotype and that the "alba" gene in females causes the spot to be paler than in homozygous recessive *aa* females. The histogram is for the largest brood available (F_1 of ♀ 1920ι); the same trend is found in the other broods (see Table). This spot-color relationship be-



Proportions of discal spot color types in GEROULD'S Brood 1920ι. Each block shows the percentage of ♂♂ or "alba" ♀♀ or *aa* ♀♀ showing the indicated color (*e.g.*, 0.6 of all ♂♂ had the spot yellow).

tween males and yellow females is the opposite of that for ground-color, in which the female has distinctly paler yellowness than does the male. The following equivalents seem to be justified:

Genotype I: ♂ pale yellow = "alba" ♀ yellow = *aa* ♀ yellow
Genotype II: ♂ yellow = "alba" ♀ pale semi-orange = *aa* ♀ semi-orange
Genotype III: ♂ pale semi-orange = "alba" ♀ semi-orange = *aa* ♀ deep semi-orange
Genotype IV: ♂ semi-orange = "alba" ♀ deep semi-orange = *aa* ♀ orange
Genotype V: ♂ orange = "alba" ♀ orange = *aa* ♀ red-orange.

Genotypes I and V seem to be rare among several hundred wild yellow (*aa*) females examined from eastern and western U.S.A. and Canada.

The genetic control of the different spot types is not entirely clear. The principal difficulty comes from the complete lack in my data of these important crosses: Type I × Type I; Type V × Type V; and Type I × Type V. The data available suggest that there are one or two pairs of genes principally controlling the color of the hindwing discal spot. As with the general ground-color of the wings, it is likely that environmental effects and modifier gene complexes influence the phenotypic expression of the basic, or "switch," genes for yellowness or redness of the discal spot. These "basic" genes seem to be acting as blending factors, with alleles for both yellow and orange expressed phenotypically.

KOMAI and AÉ (1953) suggested that the color of the discal spot in males of *C. erate poliographus* Motsch. may be controlled by a single pair of genes, with orange dominant over pale yellow. Their data were very limited, and they did not report the color of the spot in females, so it is not possible to interpret their work on the basis of the present studies.

A painstaking study of "alba" females of both *C. philodice* and *C. eurytheme* was carried out in the hope of finding discal spot differences by which heterozygous (*Aa*) "alba" females could be distinguished from homozygous (*AA*) "alba" females. This attempt was unsuccessful. However, it may be possible to find differences if a large series of absolutely certain homozygous *AA* "alba" females is available for comparison with known heterozygotes, such as our brood #61, which includes 32 "alba" females all known to be *Aa*.

No attempt has yet been made to analyze the geographic correlation of the relative frequency of the discal spot types. HOVANITZ (1945) found the spot darker in Alaskan than in more southern populations of *C. philodice.*

It has been suggested by some that the color of the discal spot is a species-recognition character for *C. philodice* and its close relative, *C. eurytheme.* The latter has the spot red-orange in males and in *aa* (orange) females. The widespread occurrence of orange spots in *C. philodice* might be considered to have been due to introgression of the orange gene into *C. philodice* following recent hybridization with *C. eurytheme.* This possibility seems to be ruled out by the fact that individuals with orange discal spots are even more numerous than those with yellow spots among the series of New England *C. philodice* collected prior to the arrival of *C. eurytheme* in New England and now preserved at Yale and in the Museum of Comparative Zoology at Harvard.

This paper has been extensively revised since it was cited in my review (Remington, 1954). When the first version was written, the Gerould Collection was not available, and certain Connecticut broods had not yet been mounted for study. It had appeared at first that the allele for yellow is recessive to the allele for orange.

SUMMARY

In *Colias philodice* from New England the yellow or orange color of the discal spot on the upper side of the hindwings appears to be controlled by one or two pairs of autosomal genes expressed as blending factors. With identical genotypes, males have phenotypically the lightest (yellowest) spot; it is deeper in "alba" females and deepest (reddest) in yellow females.

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Osborn Zoological Laboratory, Yale University, New Haven 11, Conn., U. S. A.

NOTES ON THE TERMINOLOGY OF THE LEPIDOPTEROUS MALE GENITALIA

by Wm. T. M. Forbes

Diakonoff (1954) has just published a paper intended to lead toward greater uniformity in the names of these organs. It seems to me that further consideration is called for, especially in the matter of the homologies of parts and the possibility of a resulting more consistent use for the names of the various organs. There are also a few incidental points I should like to emphasize.

Firstly, he has not considered the first published use of two of the names, which he credits to much later authors. Both are defined in Hübner's *Lepidopterologische Zuträge,* p. 26, reprinted as p. 544 of Hemming's *Hübner.* So *tegumen* (as *tegmen*) must be Hübner 1820, not Pierce 1909, and *valvæ* must be Hübner 1820 instead of Rambur 1842. Incidentally the Rambur paper is no longer as extremely rare as it has been, for it was reprinted in 1942 by the Instituto Español de Entomología, letter for letter, and with halftone reproductions of the plates, including pl. 8, which has the genitalic figures.

I submit that Diakonoff also has "failed to discriminate between the main parts" when he proposes to use a single term, *fultura penis,* for "the sclerites and their apophyses of the *diaphragma*",—for this includes body-wall sclerites (*juxta* and *transtilla*) and structures belonging to the genitalia proper (*anellus* and *ædœagus* or *penis*). Likewise a single term for the structures on the inner face of the valve, where *digitus* and *editum* belong to the costa of the valve proper (coxite), *clavus* is a totally separate organ, with a movable articulation in the Agrotinæ and many Plusiinæ, and *ampulla* and *harpé* in his sense belong to the second segment (presumably the *stylus*), with separate musculature. *Pollex*, however, is a vague geographical term, which appears to be either the clasper (*harpé* in the restricted sense) or a process of the outer portion of the valve,—in *Euxoa* apparently a fusion of both. He does not cite my own paper (Forbes 1939), which I believe makes some of these points clear. My own interpretation has been presented in part iii (Noctuidæ) of the *Lepidoptera of New York;* the figure in part i is partly mislabeled, as I did not realize then that the *digitus* has nothing to do with the clasper assembly (*stylus*).

Diakonoff also fails to cite Torre Bueno's *Glossary of Entomology,* with pls. 2 and 3 by Richards; which also was intended to promote uniformity of names.

I personally feel that a uniform division of basic names, all in Latin or Greek, and names for use in smaller groups, all in the vernacular, is not practical, in particular that the term *harpé* has become completely ambiguous in use and should be dropped; in this case we have no inclusive Latin name for the structures derived from the *stylus.* In my belief it is too early to make

a sharp separation of terms for use in a single group and those of wider application, we must propose terms as we need them and often leave it to future morphologists to figure out how wide are the homologies involved. In fact the clasper assembly (chiefly *stylus*) is a beautiful example. We know it is present in a great many families of Lepidoptera, and can be identified by its distinctive muscle, but we do not yet know whether its various parts (*ampulla,* clasper proper, basal sclerite) can really be homologized beyond the family Noctuidæ; I merely have a notion that the *ampulla*, with its tuft of sensory setæ, will be found wide-spread.

I should myself **not** make an exception of the *caulis* of OBRAZTSOV, since I see in it merely an amorphous extension of the ventral side of the anellus, independently developed in the widely separated Tortricidæ, Notodontidæ, and Lasiocampidæ. To me it reflects a physiological peculiarity,—a different manner of moving the *ædœagus.*

I do not think we can leave morphological terms out of consideration, especially when we are looking into the hope for uniformity. It is just then that we must ask if there is not some unambiguous morphological term that may take the place of several ambiguous ones. We should consider whether to substitute "*cercus*" for "upper organ" of some orders, or for "*socius*" in the Lepidoptera, but in this particular case we must move with caution, for some entomologists will not admit this organ **is** the *cercus,* which they would limit to the lower insects.

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Commander Hotel, Cambridge 38, Mass., U. S. A.

AUSTIN HOBART CLARK

American lepidopterology has lost one of its most distinguished specialists with the passing on 28 October of AUSTIN HOBART CLARK. Mr. CLARK was 73 years old and had considerably outlived physicians' expectations after a serious illness. The hundreds of his personal friends among entomologists include several lepidopterists whose introduction to Lepidoptera came primarily through him. An extensive biography of this wonderfully kind and inspiring man will appear in an early issue of the *News.*

REPLY TO THE FORBES "NOTES"

by A. DIAKONOFF

Dr. FORBES kindly sent me the manuscript of his above remarks, and I gratefully use the opportunity to answer his criticisms. I have the general feeling that Dr. FORBES and myself rather are at cross purposes. His principal concern is for homologies, to be detected by methods of comparative morphology, mine—clearing of terminology for taxonomists. Furthermore, Dr. FORBES is principally concerned with the genitalia of the Noctuidæ, and I myself, with those of the Microlepidoptera.

I regret having overlooked older use of certain terms; still this fact is very instructive, as it only proves the necessity of accepting of my suggestion (2), viz. abstention from the priority rule (Dr. FORBES completely agrees with that point); equally instructive (and considerably consoling) is the fact that HÜBNER'S *Lep. Zuträge* and the Spanish reprint of RAMBUR'S work were overlooked not only by myself but by the whole bunch of five reviewers of genital terms for the "Glossary".

Tegmen Hübner 1820, which I overlooked, is homonymous with the obsolete term *tegmen* Chapman 1898, but not with *tegumen* Pierce 1909 which still stands.

Dr. FORBES stipulates that the structures of the inner side of the valva are, morphologically speaking, of a totally different origin, judging from their separate musculature; and that therefore these structures should not be included in the compound conception *harpe* which was my suggestion; Dr. FORBES further remarks to me that the term *harpe* is ambiguous, as it was used for the *valva,* as well as for a projection on its inner surface, the "clasper". This is very true; I proposed *harpe* only because no other term seemed available. As to "clasper", it is as ambiguous a term as *harpe* is; besides it is a barbarism.

However, in my opinion, the surmised difference of the origin of these structures is of much more importance for comparative morphology than it is for taxonomy. And since homologies of such structures as *"digitus", "editum", "ampulla", "pollex",* etc. are vague (except in the Noctuidæ), as I already stipulated in my paper, and since morphologists fail to agree upon a uniform terminology for them, applicable to as many superfamilies of the Lepidoptera as possible, and not to one or two only, my suggestion (4) sub (a) to taxonomists still seems practicable in principle. I am ready to make an exception only for the "clasper" of the Noctuidæ, and not include it in the term *harpe,* provided that a new latin term is made to denote this structure.

I must fundamentally disagree with my esteemed critic where he says that ". . . we must propose terms as we need them and often leave it to future morphologists to figure out how wide are the homologies involved". In my opinion, a similar attitude is responsible for the now existing confusion of genital terminology. The intention of my paper was, among other things, to suggest preventing of such practice in the future.

Rijksmuseum van Natuurlijke Historie, Leiden, NETHERLANDS

REVIEWS

THE LEPIDOPTERA OF NOVA SCOTIA. PART I, MACROLEPIDOPTERA. By D. C. Ferguson. *Proc. Nova Scotian Inst. Science* (Halifax), vol. 23: pp. 161-375, 16 pls. Feb. 1954. [Price for separates—$2.00; available from D. C. Ferguson, Nova Scotia Museum of Science, Spring Garden Road, Halifax, N.S., Canada.]

This is an annotated check list of high quality. Any lepidopterist whose interests include the Northeast will find this an essential publication. For each species the precise Nova Scotian localities and flight dates are given, in most cases with comments on special matters such as distribution, habits, habitats, characteristics, and foodplants. Mr. FERGUSON notes that over 50,000 specimens formed the basis of the list and that he personally collected about 75% of the specimens and about 95% of the species during eleven years of intensive field work in most parts of Nova Scotia. Of the 832 species of Macrolepidoptera, 68 are butterflies, 27 Sphingidæ, 6 Saturniidæ, 3 Euchromiidæ, 3 Nolidæ, 33 Arctiidæ, 1 Agaristidæ, 426 Noctuidæ, 32 Notodontidæ, 7 Lymantriidæ, 5 Lasiocampidæ, 2 Thyatiridæ, 4 Drepanidæ, 214 Geometridæ, and 1 Epiplemidæ.

For lepidopterists outside of Nova Scotia the foodplant records will be especially useful. Mr. FERGUSON has apparently reared hundreds of species from larvæ collected in the Province. Although the prefatory remarks state that his own foodplant records are clearly distinguished from those of outside workers, this is not always the case. For example, it appears that Mr. FERGUSON has reared *Erora læta* "on beaked hazelnut (*Corylus*)", *Nymphalis j-album* on "white birch, willow", and *Zale duplicata* "most commonly bred from *Pinus strobus*", but it may be that none or all of these were actually found by him.

The 16 plates give good reproductions of photographs of over 200 specimens from Nova Scotia, including several types.

The separata of the publication include a few *corrigenda,* for small errors in the original issue, and a number of additional records bringing the total of Macrolepidoptera known from Nova Scotia to 858 species.

C. L. REMINGTON, Osborn Zool. Lab., Yale University, New Haven 11, Conn., U.S.A.

DIE SCHMETTERLINGE MITTELEUROPAS. By Walter Forster & Theodor A. Wohlfahrt. [In German.] [Third instalments, 1952]: vol. 1: pp. 65-128, text figs. 37-110; vol. 2: colored pls. 9-14. [Fourth instalments, 1953]: vol. 1: pp. 129-192, text figs. 111-147; vol. 2: colored pls. 15-18. [Fifth instalments, 1954]: vol. 1: pp. xii + 193-202 + [2]; vol. 2: pp. 65-96, text figs. 23-33, colored pls. 19-20. Publisher: Franckh'sche Verlagshandlung, W. Keller & Co., Stuttgart, Germany. Price DM. 10 each instalment.

The first and second instalments of this important work were reviewed in the *Lepid. News* (vol. 6: pp. 79-80, 1952, and vol. 7: p. 26, 1953, respectively).

The third instalment of vol. 1 deals in detail with the anatomy, development, colors and patterns of the Lepidoptera, and is accompanied by excellent and interesting figures, many of which contain a number of sub-figures. The fourth instalment discusses the biology or mode of life, enemies, parasites and diseases of the Lepidoptera, the benefits of and damage caused by Lepidoptera, their geographic distribution, genetics, systematics, and nomenclature. The fifth instalment contains the title page, preface, table of contents, a few words on nature conservation, list of literature and a subject index, thus completing the volume.

The third instalment of vol. 2, continuing with the plates of the Satyridæ, concludes *Erebia,* continues with *Agapetes, Œneis, Brintesia, Hipparchia, Arethusana, Chazara, Minois, Satyrus, Dira, Aphantopus, Pararge, Hyponephele, Maniola, Lopinga, Pyronia,*

concludes with *Cœnonympha,* and commences the Nymphalidæ beginning with *Apatura.*

The fourth instalment of vol. 2 contains plates which continue the Nymphalidæ, figuring *Limenitis, Neptis, Vanessa, Aglais, Inachis, Nymphalis, Polygonia, Araschnia, Euphydryas, Melitæa,* and *Mesoacidalia.*

The fifth instalment of vol. 2 continues the text of the Nymphalidæ with *Melitæa* and the following genera: *Mesoacidalia, Fabriciana, Pandoriana, Argynnis, Argyronome, Brenthis, Proclossiana, Clossiana, Boloria, Issoria,* embraces the Libytheidæ, *Libythea,* the Riodinidæ, *Nemeobius,* and commences the Lycænidæ with *Thecla* and the following genera: *Strymon, Callophrys, Heodes, Lycæna, Thersamonia, Palæochrysophanus, Syntarucus, Lampides, Everes, Cupido, Celastrina, Scolitantides, Philotes, Jolana, Glaucopsyche, Maculinea,* and starts *Lycæides.* The plates continue the Nymphalidæ, figuring *Fabriciana, Pandoriana, Argynnis, Argyronome, Brenthis, Clossiana,* and *Proclossiana.*

In the Satyridæ the authors have used the generic name *Agapetes* instead of *Melanargia,* although an application is now pending before the International Commission on Zoological Nomenclature to validate the latter name, to which no opposition has thus far been published, and it is in current use by Seitz and other authors.

As observed before, the European authors indulge in considerable splitting of genera, but this, in the writer's opinion, is not the subject of criticism, rather is it to be commended when based on substantial morphological characters. For that reason the reviewer has cited the genera at length so that American readers may see the whole picture.

C. F. DOS PASSOS, Washington Corners, Mendham, New Jersey, U.S.A.

THE SPECIES OF THE GENUS HYDRIOMENA *OCCURRING IN AMERICA NORTH OF MEXICO (GEOMETRIDÆ, LARENTIINÆ).* By James H. McDunnough. *Bull. Amer. Museum Nat. Hist.,* vol. 104: pp. 237-358, 3 pls., 185 figs. 6 July 1954. [Price $1.75; available from American Museum of Natural History, New York 24, N. Y., U. S. A.]

Dr. MCDUNNOUGH'S last review of *Hydriomena* was published in 1917. The new revision is a beautifully thorough treatment of this large genus. Fifty-five distinct species of *Hydriomena* are recognized, and the new genus *Hymenodria* is erected for *H. mediodentata* (B. & McD.). To taxonomists, one of the most impressive and confusing characteristics of *Hydriomena* is the great variation of wing-pattern which appears in almost any substantial series. The new revision therefore is based largely on the male genitalia and to a lesser degree the female genitalia. The genitalia are described in detail and illustrated in 185 clear figures. Unfortunately, the 63 photographs of spread specimens are so poorly reproduced that their usefulness is not as great as might be expected.

In view of the large number of species, two additions to the revision might have made it much more valuable to lepidopterists other than Geometridæ specialists. First, there is need for an identification key, regardless of phylogenetic naturalness, with which at least preliminary detailed sorting could be done; there is a small key to the nine Groups, using the male genitalia, but Group I alone has 35 species. Obviously, precise identifications of undetermined *Hydriomena* must be made, by the traditional method of "picture-book taxonomy", from male and female genitalia. However, it is a substantial advance that even this can now be done. Second, some reasoned guessing in determining the species would be possible, based on geographic data of specimens, if the "List of Species" at the end of the text were expanded to show the known general range of each form. There is no mention in the revision of larval or pupal characteristics, but foodplants are given wherever known.

The importance of Dr. MCDUNNOUGH'S authorship of this definitive revision of *Hydriomena* is emphasized by the fact that of the 104 names other than synonyms, 59 were originated by him.

C. L. REMINGTON, Osborn Zool. Lab., Yale University, New Haven 11, Conn., U.S.A.

THE LEPIDOPTERA OF PENNSYLVANIA. A MANUAL. By Harrison M. Tietz. xii+194 pp., 2 figs. State College, Penna., [Autumn 1952]. [Price $3.00; available from: School of Agriculture, Agricultural Experiment Station, Pennsylvania State College, State College, Penna., U. S. A.]

This is the first list known to me of the Lepidoptera of the entire state of Pennsylvania, and includes all the butterflies, the macroheterocera, and several families of the larger "micros." For each species listed are given: name; reference to original description; list of all synonyms, aberrations, forms and subspecies (no matter where they may occur), all with their original references; occasionally a brief commentary on the species; list of Pennsylvania localities for the species, arranged under life zones; list of foodplants of the species, as recorded in the literature or observed by Dr. TIETZ; references to life history studies. In addition to this, an introductory portion acknowledges records from various institutions; states that nomenclature follows the McDunnough 1938-1939 List (which it often does not — see below); provides a "Plan of the Work" and a list of supplementary references; gives under "List of Works Quoted" a list of periodicals (title only), list of separate works; then a list of "Authors' Names and Abbreviations" in which are also to be found names of several private collectors who have contributed records.

The appearance of the first account of Pennsylvania Lepidoptera should have been an occasion for rejoicing, especially for those of us who live in that state. Unfortunately it is not. Certainly it is a very extensive account, with a pleasingly large number of localities cited for most of the species. Furthermore, no attempt on this scale to gather the references to the original descriptions into one place has been made since Dyar's "List" of half a century ago. Again, one is often astounded at the large number of host plants cited for many of the species. These most happy points, however, soon fade before the consternation and exasperation one feels on examining the work a bit more closely. The references are to any and all forms of of the species that Dr. TIETZ has been able to find, whether they were described and are known only from Arizona, California, or wherever. This extraneous material alone must have increased the bulk of the work by a dozen or more pages. The distribution records are often hard to trace — they are given under the admittedly frequently controversial life zones, rather than by counties. A gazetteer at the end of the book is supposed to rectify matters, but in addition to making constant reference to it necessary to locate places, one soon finds further that there are localities not listed in the gazetteer, or towns of the same name are given for two different counties (and under the species he does not distinguish between them). The list of foodplants is completely uncritical. Almost never is there indicated the one most favored plant that many species are well known to have. An exception is the list of plants under *Liparis dispar* Linn., the Gypsy Moth, in which a generalization of feeding preference is made at the beginning of the list, and throughout the list the plant species are marked with the degree of preference by *L. dispar.* He gives no source for these host records individually. (We gather that some, perhaps most, are taken from the works cited, but this is not always so, and Dr. TIETZ appears to have included many records from his own local studies — valuable information, rendered almost worthless by his failure to indicate the fact.)

In addition to these points, which affect those aspects of the work which strike one most favorably at first, there are a number of other errors, both of commission and omission. In the butterflies alone the following species, known to be Pennsylvanian, are omitted: *Euchloe olympia; Strymon acadica; S. caryævorus; Lycæna epixanthe; Glaucopsyche lygdamus.* The last, in fact, was described some years ago as ssp. *nittanyensis* Cherm., from material taken very near Dr. TIETZ'S home town of State College! Similarly, though *Papilio cresphontes* is mentioned, the name *pennsylvanicus* Cherm., proposed a number of years ago for the Pennsylvania subspecies and also based on a type series from State College, is omitted! Again only in the butterflies, the following incorrect nomenclature has been found: *Eurymus* (instead of *Colias*): *Cissia* (instead of *Euptychia,* or even *Megisto*); *Satyrodes canthus* (instead

of *Lethe eurydice*); *nycteis* under *Phyciodes* instead of *Melitæa,* where it belongs; *Strymon calanus* (instead of *S. falacer); Plebeuis* (*sic*) *scudderi* (instead of *Plebeius* — or *Lycæides* — *melissa samuelis* Nab.).

The most unaccountable omissions of all are the several very important recent works on the eastern part of the continent which Dr. TIETZ has completely failed to cite, not to mention the majority of recent smaller studies. All references to Holland's *Butterfly Book* are to the early edition, despite the fact that the revised edition has been published now over twenty years! There appears to be no reference to Forbes' *Lepidoptera of New York State,* an indispensible publication. Klots' magnificent *Field Guide to the Butterflies* is likewise omitted in its entirety, though this is so recent that omission may have been unavoidable. Had the author paid any attention to this latter, however, most of the nomenclatorial errors cited above would have been avoided. Indeed, had he followed the McDunnough list faithfully, as is claimed, he would have avoided the greater part of them by far.

One could fill many more pages with additional errors. It shall suffice, however to point out just one more: the habit of separating author's name and journal or separate work reference each in a much abbreviated list of its own has made almost impossible any check of literature covered, and makes all these lists useless. How much better, and infinitely more valuable, it would have been had Dr. TIETZ followed conventional practice of including a bibliography, giving author, date, title and full reference of each paper cited. Certainly it would have been long, but he would have shortened his text citations thereby; would have eliminated the worthless lists of authors, separate works and periodicals in the introduction; and would have provided a thoroughly usable list. I believe he would not only have gained utility, but would actually have saved space. Dr. TIETZ' curious manner of listing harks back to the days of W. F. KIRBY and others, when a proper bibliographic citation style had not been developed (nor was then particularly needed).

It is obvious that this book could have been written so as to include not only the information it already has, but much more, and the whole in much more accessible and convenient fashion, and further, at a great saving of space.

HARRY K. CLENCH, Carnegie Museum, Pittsburgh 13, Penna., U. S. A.

GEROULD GENETICAL COLLECTION NOW AT YALE UNIVERSITY

Professor JOHN H. GEROULD, of Dartmouth College, Hanover, New Hampshire, has transferred his collection of *Colias* to Yale University. Included are the classic broods which allowed him to discover the heredity of the "alba" female form (*Amer. Nat.* 45: 257-283, 1911; *Genetics* 8: 495-551, 1923), the many hybrid broods between *C. philodice* and *C. eurytheme* and between eastern and western populations of *C. philodice* (*Proc. Amer. Philosophical Soc.* 86: 405-438, 1943), the "alba" gynandromorph (*Journ. Exper. Zool.* 42: 263-286, 1925), the "blue-green" and "olive-green" sets (*ibid.* 43: 413-425, 1926), the several Hanover population samples, and a number of other important series. The specimens are in Denton mounts or are spread but not pinned. Gradually, certain broods of this great collection will be mounted on pins and arranged with the large representation of *Colias* genetic materials in my laboratory. Already the GEROULD broods have been used in a study of hindwing discal spot genetics, published elsewhere (*Lepid. News* 8: 163-166), and the collection will be used for similar investigations in the future.

C. L. REMINGTON, Osborn Zool. Lab., Yale University, New Haven 11, Conn., U.S.A.

NOTICES

Bombycidæ and Noctuidæ from Italy, Austria, High Alps, and Turkey for sale. 1954 catch about 1800 specimens, many rarities, full data. Lots of 100 mixed specimens including Rhopalocera $4.50, 200 specimens $8.00. Dr. H. Wilcke, Kössen/Tyrol, AUSTRIA.

Offered: Fernald's "The Crambidæ of North America" (1896; with colored plates) in exchange for named Micros or other Lepidoptera. Dr. Marion E. Smith, Department of Entomology, University of Massachusetts, Amherst, Mass., U.S.A.

Wanted: adult specimens of *Papilio hector, P. agamemnon, P. demoleus, P. epidaus fenochionis.* Also *Dismorphia amphione praxinoe,* ♀ and ♂. George L. Crowder, 913 South Hamilton, Marissa, Ill., U.S.A.

Wish to contract immediately with museums, other institutions, and individuals to collect Lepidoptera and other insects and small animal life in the following regions: South and Central America; Mexico, Cuba, southern Florida; Hawaii; Africa; Alaska. Larry J. Kopp, R.D., Klingerstown, Penna., U.S.A.

Will send a copy of my annotated check list of the hundred butterflies of the Oglethorpe University campus in Georgia to anyone sufficiently interested to send a large self-addressed envelope and 9¢ postage to John P. Knudsen, 120 So. Boundary St., Chapel Hill, N. Car., U.S.A.

Wanted: perfect specimens of ♂ ♀ of *Troides alexandræ* from New Guinea. I will purchase if price is reasonable. Also desire *Agrias* from South America, single specimens ♂ ♀ of the yellow and blue varieties. A.J. Carpenter, 236 Huntington Ave., Boston, Mass., U.S.A.

Wanted for cash: specimens, with full data, of *Strymon falacer, S. edwardsii, Phyciodes batesii, Polygonia faunus, Asterocampa flora, Melitæa harrisi,* and *Enodia creola.* No exchanges. Roderick R. Irwin, 411 North Bloomington St., Streator, Illinois, U.S.A.

LIVING MATERIAL

LIVING PUPÆ OF *PAPILIO EURYMEDON* urgently needed for research purposes; will purchase or exchange. Lincoln P. Brower, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

OFFICIAL ACTION ON NAMES OF LEPIDOPTERA

Notice has been received from FRANCIS HEMMING, Secretary of the International Commission on Zoological Nomenclature, that applications have been received by the Commission for the use of its Plenary Powers to validate the name *Melanargia* Meigen, 1828 (Satyridæ) and to preserve the name *Polyommatus* Latreille, 1804 (Lycænidæ) and continue suppressing *Argus* Boisduval, 1832. Any interested person who wishes to comment on the application for *Polyommatus* should do so as soon as possible by writing the Secretary at 28 Park Village East, Regent's Park, London, N.W. 1, England. This must be done before 22 April 1955. The deadline for *Melanargia* was 11 Nov. 1954.

W. T. M. FORBES' Part III (Noctuidæ) of *The Lepidoptera of New York* has just been published and may be purchased for $1.50 from: The Mailing Room, Roberts Hall, N. Y. State College of Agriculture, Ithaca, N. Y., U. S. A. Part II is still available for $1.50, and a few copies of Part I have been found and may be purchased for $1.75. Parts II and III together are sold for $2.75. A full review of Part III will appear in the *News.*

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed publications on Lepidoptera from all scientific periodicals available to our cooperating abstractors. It is intended that every paper and book related to Lepidoptera and published in any part of the world after 1946 will be included. ***Abstracts give all new species, subspecies, genera, and higher categories, with type localities and generotypes, but varieties, aberrations, etc. are omited.*** Papers from *The Lepidopterists' News* are listed but not abstracted. Initials of cooperating abstractors are as follows: [P.B] — P. F. BELLINGER; [A.D.] — A. DIAKONOFF; [W.H.] — WALTER HACKMAN; [N.O.] — NICHOLAS OBRAZTSOV; [C.R.] — C. L. REMINGTON; [J.T.] — J. W. TILDEN; [P.V.] — PIERRE E. L. VIETTE.

E. DISTRIBUTION AND PHENOLOGY

Bauer, David L., "A suvey of the butterflies of the Verde Valley." *Plateau, Mus. No. Arizona,* vol. 26: pp. 95-102. Jan. 1954. Discusses general faunistics of Verde Valley. Gives checklist of 134 species found there. [C.R.]

Burmann, Karl, "Eigenartiges Höhenvorkommen zweier Mikrolepidopteren" [in German]. *Nachrbl. Bayer. Ent.,* vol. 1: pp. 38-39. 15 May 1952. Vertical distribution of *Dioryctria abietella* and *Steganoptycha dinana* in N. Tirol. [N.O.]

Chiaromonte, A., "Occurrence of the Cotton Pink Bollworm in Eritrea." *Plant Prot. Bull.,* vol. 2: pp. 41-42. Dec. 1953. *Platyedra gossypiella;* new record.

de Lucca, C., "New additions to the Lepidoptera of Malta." *Entomologist,* vol. 84: pp. 258-259. Nov. 1951. 4 noctuids, 1 geometer, 3 pyralids, 17 micros. [P.B.]

Owen, D. F., "Bombed site Lepidoptera." *Entomologist,* vol. 84: pp. 265-272. Dec. 1951. Fauna of devastated parts of London. [P.B.]

Picard, J., "Hesperiidæ du Liberia collectés par P. L. Dekeysar et B. Holas" [in French]. *Bull. Inst. Franc. Afr. Noire,* vol. 12: pp. 625-628. "July" [Sept.] 1950. List of spp. collected, and of spp. recorded from Liberia by Evans; zoogeographical notes. [P.B.]

Remington, P. S., "Collecting along the Alaska highway." *Lepid. News,* vol. 6: pp. 103-106. 19 Feb. 1953.

Rindge, Frederick H., "The butterflies of the Bahama Islands, British West Indies (Lepidoptera)." *Amer. Mus. Novit.,* no. 1563: 18 pp. 12 May 1952. Annotated list of 54 spp.

Ross, Herbert H., "On the origin and composition of the nearctic insect fauna." *Evolution,* vol. 7: pp. 145-158, 7 figs. June 1953. Discussion of a few groups for which biogeographical information is reasonably complete, including Saturniidæ (based on Michener's revision). [P.B.]

Thomas, Edward S., "A European skipper, *Adopæa lineola,* at Columbus, Ohio." *Lepid. News,* vol. 6: pp. 92-93. 19 Feb. 1953.

Tucker, R. W. E., "The insects of Barbados." *Journ. Agric. Univ. Puerto Rico,* vol. 36: pp. 330-363. Oct. 1952. Partial list, recording food habits in most cases; lists 98 Lepidoptera in 19 families. [P.B.]

Various authors, "The field season summary of North American Lepidoptera for 1952." *Lepid. News,* vol. 7: pp. 66-118, 1 map. 5 Nov. 1953.

Warnecke, Georg, "Neue und bemerkungswerte Grossschmetterlinge in Schleswig- und dem nordelbischen Gebiet von Hamburg" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holstein,* vol. 5: pp. 18-22, 42-44; vol. 6: pp. 6-7. 1952-1953. Annotated lists: 15 spp. new to the area in the last 10 years, 13 which have only recently become common, and 34 others (mostly butterflies, Noctuidæ, Geometridæ). [P.B.]

Warnecke, Georg, "Die Verbreitung des Eulenfalters *Eugnorisma (Rhyacia Agrotis) depuncta* L. in Schleswig-Holstein" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holstein,* vol. 5: pp. 39-42, 1 map. 1952. All records in this area are east of the terminal morain of the last glaciation. [P.B.]

Williams, C. B., "The relative abundance of different species in a wild animal population." *Journ. Anim. Ecol.,* vol. 22: pp. 14-31, 9 figs. May 1953. Relation between number of individuals and number of species, based mainly on light-trap captures of Macrolepidoptera. [P.B.]

Willstedt, H., "Witterungseinflüsse auf das Falterleben des Regnitztales im Jahre 1947" [in German]. *Zeits. Wiener Ent. Ges.*, vol. 34: pp. 134-139. 15 Sept. 1949. Reports favorable effects of hot, dry summer on some Lepidoptera, and other phenological observations. [P.B.]

F. BIOLOGY AND IMMATURE STAGES

Bergold, G. H., & E. F. Wellington, "Isolation and chemical properties of the membranes of an insect virus and their relation to the virus and polyhedral bodies." *Journ. Bact.*, vol. 67: pp. 210-216, 4 figs. Feb. 1954. Pathogen of *Bombyx mori.*

Blais, J. R., "The recurrence of Spruce Budworm infestations in the past century in the Lac Seul area of northwestern Ontario." *Ecology*, vol. 35: pp. 62-71, 6 figs. Jan. 1954. Concludes that budworm outbreaks are associated with arrival at maturity of balsam fir stands; the mature trees are killed by repeated defoliation. The last outbreak cycle occurred some 85 years ago, judging from growth ring studies. [P.B.]

Brandt, Herbert, "Uber die Einfluss der Kopulation auf die Eiproduktion und Eiablage von Schmetterlingsweibchen" [in German]. *Zeitschr. Naturforsch.*, vol. 2b: pp. 301-308. 1947. Reports specific effect of mating in increasing number of mature eggs and number of eggs laid in ♀♀ of *Bupalus piniarius* and *Ephestia kühniella.* [P.B.]

Breese, Michael H., "The maize stalk borer." *Nyasaland Agric. Quart. Journ.*, vol. 8: pp. 31-37. "Apr." Sept. 1949. Biology and control of *Busseola fusca.*

Brown, E. S., "Mimicry as illustrated in the British fauna." *New Biology*, no. 10: pp. 72-94, 6 pls. 1951. Popular account of mimics of bees and wasps, including *Hemaris* and Ægeriidæ. [P.B.]

Burmann, Karl, "*Crambus maculalis* Zett. (Microlepidoptera, Pyralidæ)" [in German]. *Wiener Ent. Ges.*, vol. 32: pp. 69-75, 6 figs. 10 May 1948. Describes early stages, biology, and variation; names 2 aberrations. [P.B.]

Burmann, Karl, "Aus dem Leben von *Symmoca signella* Hb. (Microlepidoptera, Gelechiidæ)" [in German]. *Zeitschr. Wiener Ent. Ges.*, vol. 32: pp. 81-90, 7 figs. 30 June 1948. Early stages & biology.

Butcher, R. W., "Biological flora of the British Isles. *Atropa* L. *Atropa belladonna* L." *Journ. Ecol.*, vol. 34: pp. 345-353, 2 figs. Aug. 1947. Larvæ of *Pieris brassicæ* and *Mamestra* have been found on the plant. [P.B.]

Casey, Jewell, "The life of the Cecropia Moth -story in pictures." *Frontiers*, vol. 16: pp. 144-145, 9 figs. June 1952.

Chace, Lynwood M., "The picture story of the Cecropia Moth." *Frontiers*, vol. 15: pp. 16-17, 7 figs. Oct. 1950.

Chapman, V. J., "Biological flora of the British Isles. *Suæda maritima* (L.). *Suæda fruticosa* Forsk." *Journ. Ecol.*, vol. 35: pp. 293-310, 9 figs. Dec. 1947. Larvæ of *Coleophora suædivora, C. atriplicis, Phthorimæa suædella, P. salicorniæ* reported feeding on spp. of *Suæda.* [P.B.]

Chapman, V. J., "Biological flora of the British Isles. *Halimione portulacoides* (L.) Aell." *Journ. Ecol.*, vol. 38: pp. 214-222, 2 figs. July 1950. Larval food plant of *Coleophora atriplicis, C. salinella, Aristotelia stipella, Phthorimæa instabilella.* [P.B.]

Chernoponevkina, S. M., "A new insect attacking lucerne: a moth of the genus *Phasiane* (Lepidopt., Geometridæ); control methods." [in Russian]. *Dokl. Vses. Akad. Selsk. Nauk im. Lenina*, vol. 13 no. 1: pp. 37-38. 1948. [Not seen.]

Clements, A. N., "On the urticating properties of adult Lymantriidæ." *Proc. Roy. Ent. Soc. London (A)*, vol. 26: pp. 104-108, 1 fig. 15 Sept. 1951. In some genera the female collects urticating larval hairs from the cocoon and sheds them with her own hair for the protection of the egg. [P.B.]

Clawson, J. R., "The bug in the built-in bungalow." *Nat. Hist.*, vol. 61: p. 279, 1 fig. June 1952. Larva of *Thyridopteryx ephemæriformis.*

Dowden, Philip B., H. A. Jaynes, & V. M. Carolin, "The role of birds in a Spruce Budworm outbreak in Maine." *Journ. Econ. Ent.*, vol. 46: pp. 307-312. April 1953. Predation by birds on larvæ of *Choristoneura fumiferana* measured by comparing two sites, on one of which all birds were shot. [P.B.]

Ekvtimishvili, Z. S., "Materials pertaining to the biology of the platanus moth *Lithocolletis platani* Stgr." [in Russian]. *Soobshch. Akad. Nauk Gruzinskoi SSR*, vol. 13: pp. 469-476. 1952. [Not seen.]

Emme, A. M., "Certain problems in the theory of the diapause in insects" [in Russian]. *Usp. Sovrem. Biol.*, vol. 35: pp. 395-424. May/June 1953. [Not seen.]

Löberbauer, Rudolf, "Eine interessante Beobachtung bei *Colias edusa* F." [in German.] *Zeits. Wiener Ent. Ges.,* vol. 34: pp. 123-124. 15 Sept. 1949. Second generation of local population consisted only of ♂♂ and one ♀ parasitized by a nematode which had consumed the ovaries. Absence of ♀♀ perhaps caused by selective effects of unfavorable weather on larvæ. [P.B.]

Loibl, Hans, "Schmetterlinge in Hamburgs Gärten und Parks. Schmetterlinge als Kulturfolger" [in German]. *Mitt. Faun. Arbeitsgem. Schleswig-Holstein,* vol. 6: pp. 38-45. 1953. Discussion and annotated list of Macrolepidoptera which find optimum conditions in settled areas and cities. [P.B.]

Parrott, Arthur W., "A systematic catalogue of Australian Braconidæ." *Pacific Sci.,* vol. 7: pp. 193-218. Apr. 1953. Records hosts when known; with host index, including 23 Lepidoptera. [P.B.]

Paulian, R., "Observations sur les Boroceras de Madagascar, papillons séricigènes (Lep. Lasiocampidæ)" [in French]. *Naturalliste Malgache,* vol. 5: pp. 69-86, 8 figs. 1953. Important study on the nomenclature and the biology of two silkworms from Madagascar: *B. madagascarensis* and *B. marginepunctatus;* with figures of the larvæ. [P.V.]

Synyts'kyi, M. M., "Feeding the Oak Silkworm on willows" [in Russian]. *Dopovidi Akad. Nauk URSS,* no. 1: pp. 41-46. 1951. [Not seen].

Tsao, Ching-Hsi, "Quantitative effects of diet, age, temperature and humidity on the fecundity of five representative species of insects." *Diss. Abs.,* vol. 12: p. 236. 1952. Abstract only; including *Galleria.*

Waldner, Franz, "Das Vorkommen der Zackeneule (*Scoliopteryx libatrix* L.) in Höhlen" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 37: pp. 176-182, 1 pl., 1 fig. Brief description of moth, early stages, and biology. Lists numerous records of occurrence in caves in Europe and U. S. A. [P.B.]

Walker, Robert L., "Spiny Bollworm of cotton in Iraq." *Plant Prot. Bull.,* vol. 1: p. 42. Dec. 1952. *Earias insulana;* lists alternative foodplants. [P.B.]

Wellington, W. G., J. J. Fettes, K. B. Turner, & R. M. Belyea, "Physical and biological indicators of the development of outbreaks of the Spruce Budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidæ)." *Canad. Journ. Res., Sect. D,* vol. 28: pp. 308-331, 1 pl., 10 figs. Dec. 1950. Describes consistent association of budworm outbreaks with particular preceding meteorological conditions and with outbreaks of *Malacosoma disstria.* P.B.

Williams, J. R., "The larvæ and pupæ of some important Lepidoptera." *Bull. Ent. Res.,* vol. 43: pp. 691-701, 5 figs. Jan. 1953. Detailed descriptions, well illustrated, of early stages of pest species from Mauritius: *Sesamia calamistis, S. inferens, S. uniformis, Proceras sacchariphagus, P. indicus, Argyroploce schistaceana, A. leucotreta, Cryptophlebia williamsi, O. peltastica.* Key to larvæ of the last 4. [P.B.]

Wittstadt, H., "Über den Geschlechtsduft der Schmetterlinge" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 35: pp. 81-87. 1 June 1950. Discussion of sexual odors of Lepidoptera, and results of some experiments on the distances at which they are effective: up to 4 km. for ♀ scent (*Lemonia dumi*), only a few meters for ♂ scent (Sphingidæ, *Endromis*). [P.B.]

G. PHYSIOLOGY AND BEHAVIOR

Agrell, Ivar, "Occurrence and metabolism of free amino acids during insect metamorphosis." *Acta Physiol. Scand.,* vol. 18: pp. 247-258, 5 figs. 15 Aug. 1949. Study on pupæ of *Phalera bucephala* and *Calliphora.* [P.B.]

Allegret, Paul, "Conditionnement précoce de la métamorphose chez *Galleria mellonella* L." [in French]. *C. R. Acad. Sci. Paris,* vol. 234: pp. 1641-1643. 16 Apr. 1952. Young larvæ fed on pure wax may molt once and then pupate, or molt repeatedly and then die; difference correlated to some extent with weight, but not strictly with instar. [P.B.]

Andrewartha, H. G., "Diapause in relation to the ecology of insects." *Biol. Revs.,* vol. 27: pp. 50-107, 5 figs. Feb. 1952. Review article, with numerous examples from the Lepidoptera and their parasites; extensive bibliography. [P.B.]

von Buddenbrock, W., & I. Moller-Racke, "Neue Beobachtungen über den farbensinn der Insekten" [in German, English summary]. *Experientia,* vol. 8: pp. 62-63. 15 Feb. 1952. Tests of 'Luminosity' of certain colors to 22 spp. of butterflies, of 5 families. Suggests separate perceptors for yellow, green-blue, and orange-red. Order of brightness similar for members of same family. [P.B.]

Bückmann, Detlef, "Die Umfärbung von Schmetterlingsraupen vor der Verpuppung (Untersuchungen an *Cerura vinula*)" [in German]. *Naturwiss.*, vol. 39: pp. 213-214. 1952. Prepupal color change of larva is under control of pupation hormone. [P.B.]

Goodwin, T. W., "The pigments in colour phases of the larvæ of *Plusia gamma* L. (the Silver-Y Moth)." *Biochem. Journ.*, vol. 55: pp. 834-838, 2 figs. Dec. 1953. Study of carotenoids and melanins in hemolymph and integument of normal and dark phase (crowded) larvæ; the former lack melanin in integument. [P.B.]

Hadorn, Ernst, & Alfred Kühn, "Chromatographische und fluorometrische Untersuchungen zur biochemischen Polyphänie von Augenfarb-Genen bei *Ephestia kükniella*" [in German]. *Zeits. Naturf.*, vol. 8b, pp. 582-589, 4 figs. Oct. 1953. Demonstrates differences in concentrations of some fluorescing substances in imaginal heads of normal and eye-color mutant stocks of *Ephestia, Plodia,* and *Ptychopoda.* [P.B.]

Jones, Jack Colvard, "On the heart in relation to circulation of hemocytes in insects." *Ann. Ent. Soc. Amer.*, vol. 46: pp. 366-372, 4 figs. Sept. 1953. Blood cells circulate throught the heart in *Galleria, Pieris,* and *Heterocampa,* but not in all insects. [P.B.]

Kursanov, A. L., & E. I. Vyskrebentseva, "Exchange of gases in the hemolymph of the silkworm during the development of the chrysalis" [in Russian]. *Biokhimiia,* vol. 18: pp. 363-370. May/June 1953. [Not seen].

Leppik, E. E., "The ability of insects to distinguish number." *Amer. Nat.*, vol. 87: pp. 229-236, 4 figs. July/Aug. 1953. Reports certain insects, including some butterflies and moths, can distinguish numbers of petals on a flower. [P.B.]

Magnus, Dietrich, "Über optische 'Schlüsselreize' bein Paarungsverhalten des Kaisermantels *Argynnis paphia* L. (Lep. Nymph.)" [in German]. *Naturwiss.*, vol. 23: pp. 610-611. Dec. 1953. Reports that color and pattern movement are key factors for sexual attraction of ♂ *A. paphia;* stimulus created by rotating cylinder with black and colored stripes is as effective as moving model or living female. [P.B.]

H. MIGRATION

[Anonymous], "Monarch man." *Life,* vol.36: pp. 61-62, 4 photos. 24 May 1954. Photographic story about C. A. Anderson and his studies of migration of *Danaus plexippus.* [C.R.]

Bretherton, R. F., "Early immigrants in north-west Surrey." *Entomologist,* vol. 85: p. 96. Apr. 1952. *Nomophila* and Noctuidæ.

Briscoe, Margaret Villiers, "Butterfly migration in the Nilgiris." *Journ. Bombay Nat. Hist. Soc.*, vol. 50: pp. 417-418. Dec. 1951. *Danaus* and *Catopsilia.*

Burmann, Karl, "Einige Beobachtungen über *Pyrameis cardui* L. aus Nordtirol (Lepidoptera, Nymphalidæ)" [in German]. *Ent. Nachrbl.*, vol. 3: pp. 181-183. Oct./Nov. 1951. Lists occurrence in 4 years, and instances in which directional flight (always south to north) was observed. [P.B.]

Burmann, Karl, "Spätherbstliche Wanderfalterbeobachtungen im Stadtgebiet von Innsbruck" [in German]. *Nachrbl. Bayer. Ent.*, vol. 1: pp. 81-83. 15 Nov. 1952. Records 35 immigrant spp. [N.O.]

Burmann, Karl, "War 1951 ein Wanderjahr für *Codonia pupillaria* Hb? (Lepidoptera, Geometridæ)" [in German]. *Ent. Nachrbl.*, vol. 5: pp. 26-28. March/April 1953. Appearance of the species, new to north Tyrol, with many immigrants from the south, suggests that 1951 was an outbreak year for it. [P.B.]

Clark, Austin H., "The first record of a butterfly migration in America." *Lepid. News,* vol. 6: p. 42. 8 Aug. 1952.

Cockbill, G. F., "Records of migrations of *Catopsilia florella* F. (Pieridæ) from Southern Rhodesia, 1922-1950." *Proc. Roy. Ent. Soc. London (A),* vol. 26: pp. 113-128, 4 figs. 17 Dec. 1951.

Common, I. F. B., "Migration and gregarious æstivation in the Bogong Moth, *Agrotis infusa.*" *Nature,* vol. 170: pp. 981-982. 6 Dec. 1952. Australian species passes summer in large colonies on rocks at high altitude; unidirectional flights to and from æstivation site recorded. [P.B.]

Darlow, H. M., "Observations on migrant Lepidoptera in the Mediterranean." *Entomologist,* vol. 84: pp. 246-254. Nov. 1951. Migratory swarms near land; captures at sea; captures of butterflies at light. [P.B.]

Ekholm, Svante, "On mass appearance of *Phytometra gamma* L. (Lep., Noctuidæ) in 1946." *Notul. Ent.*, vol. 26: pp. 85-87, 1 map. Feb. 1947. Deals with a mass appearance and migration of this species in Finland. Lists 4 parasites. [W.H.]

Ekholm, Svante, "Om en begränsad vandring av *Phytometra gamma* L. år 1949 vid Finska vikens kust" [in Swedish, English summary]. *Notul. Ent.,* vol. 30: pp. 127-128. Dec. 1950. Records a limited migration of *P. gamma* along the south coast of Finland. [W.H.]

Ekholm, Svante, "Migrations of the Painted Lady, *Vanessa cardui* L. (Lep., Nymphalidæ) in 1948 in Finland." *Notul. Ent.,* vol. 31: pp. 2-15, 1 fig., 1 table, 2 diagr. May 1951.

Fager, E. W., "Migration notes from Mexico." *Lepid. News,* vol. 6: p. 44. 8 Aug. 1952.

Farner, D. S., "The 1952 invasion of California Tortoise Shell butterflies". *Crater Lake Nature Notes* 18: 24. 1952. Describes immigration of *Nymphalis californica,* with citations of notes on early invasions at Crater Lake, Oregon. [R. H. Whittaker.]

Fender, Kenneth M., & James H. Baker, "Notes on the migration of *Nymphalis californica.*" *Lepid. News,* vol. 7: p. 15. 20 Apr. 1953.

Freund, A., "Beobachtungen über die Gattung *Yponomeuta* L. (Yponomeutidæ, Lep.)" [in German]. *Nachrbl. Bayer. Ent.,* vol. 2: pp. 4-6. 15 Jan. 1953. Discusses a migration in the Alps. [N.O.]

Fulton, MacDonald, "Migration of the Monarch Butterfly through Chicago." *Lepid. News,* vol. 7: p. 28. 20 Apr. 1953.

Harz, Kurt, "Wanderschmetterlinge und ihre Erforschung" [in German]. *Natur und Volk,* vol. 82: pp. 236-237. 1 July 1953. General remarks on migrations of Lepidoptera; reports formation of "Deutsche Forschungszentrale für Schmetterlingswanderungen". [P.B.]

Hayward, Kenneth J., "Migration of butterflies in Argentina during the spring and summer of 1951-52." *Proc. Roy. Ent. Soc. London (A),* vol. 28: pp. 63-73. Observations on *Ascia monuste and Libytheana carinenta.* [P.B.]

Huggins, H. C., "Migrants in 1951." *Entomologist,* vol. 85: pp. 42-43. Feb. 1952. Notes on several spp. in Britain. [P.B.]

Lempke, B. J., "Trekvlinders in 1949, 10e jaarverslag, slot" [in Dutch: Migratory Lepidoptera in 1949, 10th annual report finished; with English summary]. *Ent. Berichten,* vol. 13: pp. 147-153, 2 figs. 1 Oct. 1950. 15 spp. discussed, 2 graphs on *Plusia gamma* given. [A.D.]

Lempke, B. J., "Trekvlinders in 1952. 13e jaarverslag (slot)" [in Dutch, English summary]. *Ent. Berichten,* vol. 14: pp. 339-345, 2 figs. 1 Sept. 1953.

Maclaren, P. I. R., "Migration of butterflies." *Nigerian Field,* vol. 17: p. 191. Oct. 1952. Records migration of *Libythea labdaca.* [P.B.]

Marchant, S., "Notes on a migration of the butterfly *Libythea labdaca. Nigerian Field,* vol. 15: pp. 88-90. Apr. 1950. Near Owerri, Nigeria, flying north. [P.B.]

Mather, Bryant, "A migration of *Ascia monuste* in Mississippi." *Lepid. News,* vol. 7: pp. 13-14. 20 Apr. 1953.

Muspratt, Vera Molesworth, "Southward migration of Rhopalocera in the South of France." *Entomologist,* vol. 84: pp. 226-229. Oct. 1951. Mainly Pieridæ.

Muspratt, V. M., "Observations sur quatre migrations de Lépidoptères" [in French]. *Rev. franc. Lépid.,* vol. 13: pp. 125-127. "Sept./Oct." [28 Dec.] 1951. *Abraxas pantaria, Hæmorrhagia fuciformis, Catocala elocata, Pieris brassicæ, Leucochloe daplidice.*

Mazzucco, Karl, "Falterwanderwellen aus dem Süden" [in German]. *Zeits. Wiener Ent. Ges.,* vol. 38: pp. 81-87, 1 fig. 30 April 1953. Study of migrations of *Pyrameis cardui;* thinks immigrants in Austria are usually of the 3rd generation, the capacity for flight of the first two sufficing only to bring the migrant population across the Mediterranean from the North African winter breeding range. [P.B.]

Nabokov, Vladimir, "Migratory species observed in Wyoming, 1952." *Lepid. News,* vol. 7: pp. 51-52. 29 July 1953.

Nielsen, Eric Tetens & Astrid Tetens, "Contributions towards the knowledge of the migration of butterflies." *Amer. Mus. Novit.,* no. 1471: 29 pp., 10 figs. 27 Oct. 1950. Study based on Florida migrations of *Ascia monuste.* Describes and figures all stages and records foodplants. The prerequisites for a migratory movement is a mass emergence of adults - that is, a population which produces adults in one or more "waves" rather than continuously. Discusses range and direction of observed migrations, and factors affecting them. During migration the butterflies lack the normal instincts of sedentary adults; the flight may be regarded as a goal in itself, not a purposeful movement. [P.B.]

Nordman, Adolf, "Vaeltavista perhosistamme" [in Finnish]. *Luonnon Tutkija,* vol. 51: pp. 73-79, 3 figs. 1947. On migrating Lepidoptera in Finland. [W.H.]

Riley, N. D., "Immigrants of *Vanessa cardui* in March." *Entomologist,* vol. 85: pp. 95-96. Apr. 1952.

Sicher, Harry, "Migration of *Vanessa carye.*" *Lepid. News,* vol. 7: p. 53. 29 July 1953.

I. TECHNIQUE

Belkin, John N., & William A. McDonald, "Preparing Lepidoptera for class study." *Lepid. News,* vol. 6: pp. 61-63, 1 fig. 1952.

Bellinger, Peter F., "Salmon's fluid, a new mounting medium for slides of small larvæ and larval pelts of Lepidoptera." *Lepid. News,* vol. 7: pp. 170-171. 12 Feb. 1954.

Crane, Jocelyn, "Housekeeping for butterflies." *Animal Kingdom,* vol. 57: pp. 138-143, 5 photos. Oct. 1954. Describes the large "butterfly houses" built for study of butterfly behavior at Simla, Trinidad, by William Beebe, Henry Fleming, and author. [C.R.]

Daniel, Franz, "Praxis des Nachtfangs mit Licht" [in German]. *Nachrbl. Bayer. Ent.,* vol. 1: pp. 44-46, 51-54, 61-63, 67-68. 15 June, 15 July, 15 Aug., 15 Sept. 1952. Discusses methods and problems of collecting moths by the aid of light. [N.O.]

Dickson, R. C., M. M. Barnes, & C. L. Turzan, "Continuous rearing of the Codling Moth." *Journ. Econ. Ent.,* vol. 45: pp. 66-68, 2 figs. Feb. 1952. Describes technique for laboratory culture of *Carpocapsa pomonella* and *Grapholitha molesta.* [P.B.]

van Dinther, J. B. M., "An apparatus for breeding insects" [in Dutch, English summary]. *Tijdschr. Plantenziekten,* vol. 59: p. 200, 1 fig. 1953.

Evans, William H., "Luring *Anthocaris sara* into the net." *Lepid. News,* vol. 6: pp. 101-102. 19 Feb. 1953.

Foltin, Hans, "Der Lichtfang, Erfahrungen und Beobachtungen" [in German]. *Ent. Nachrbl.,* vol. 3: pp. 201-206. Dec. 1951. Observations on factors involved in collecting at light. [P.B.]

Gomes, Jalmirez G., & Americo L. Gonçalves, "Generalidades sobre o método de criação do *Trichogramma* na Estação Fitossanitaria de S. Bento - D. D. S. V." [in Portuguese]. *Bol. Fitossanit.,* vol. 3: pp. 171-184, 10 figs. "1946" [1947]. Technique of rearing this parasite and its host, *Sitotroga cerealella.* [P.B.]

Guppy, Richard, "Rearing *Speyeria* in captivity." *Lepid. News,* vol. 7: p. 56. 29 July 1953.

Heize, K., "Eine neue Einbettungsmittel für kleine Insecten, insbesondere für Blattläuse" [in German]. *Trans. 9th Int. Congr. Ent.,* vol. 1: pp. 177-179. March 1953. Recommends for mounting small insects: 10 g. polyvinyl alcohol, 35 cc. lactic acid, 25 cc. phenol (15%), 10 cc. glycerine, 20 g. chloral hydrate, 40-60 cc. distilled water. [A.D.]

Janmoulle, E., " 'Boite Newman' modifiée pour la récolte de Microlépidoptères" [in French]. *Lambillionea,* vol. 52: p. 46. 25 Aug. 1952. Technique for collecting and transporting micros without damage. [P.B.]

Jöst, H., "Zygænentod" [in German]. *Nachrbl. Bayer. Ent.,* vol. 1: p. 56. 15 July 1952. To kill *Zygæna* moths rapidly, the author proposes to exhale some air from the mouth into a cyanide bottle. [N.O.]

Johnson, C. G., "A suction trap for small airborne insects which automatically segregates the catch into successive hourly samples." *Ann. Appl. Biol.,* vol. 37: pp. 80-91, 1 pl., 5 figs. March 1950. Description of trap based on electric fan. [P.B.]

Knudsen, John P., "A new method for storing papered Lepidoptera." *Lepid. News,* vol. 7: p. 27. 20 Apr. 1953.

Legay, Jean-Marie, "Sur une méthode d' étude quantitative de la prise de nourriture chez le Ver à Soie" [in French]. *C. R. Acad. Sci.,* vol. 236: pp. 326-328, 2 figs. 1953. Method of analysing feeding, by weighing animal, food, and excreta. [P.B.]

Peterson, Alvah, *A manual of entomological techniques.* 7th ed. v + 367 pp., 182 pls. Ann Arbor. April 1953. Revised edition of this useful work. In addition to general information, directions are given for laboratory rearing of some economically important Lepidoptera. [P.B.]

Quelch, C. S., "Specimens which die with wings reversed." *Lepid. News,* vol. 6: p. 44. 8 Aug. 1952.

Ross, Edward S., "What's your hobby? How to photograph insects." *Pacif. Discovery,* vol. 4, no. 5: pp. 26-29. Sept. Oct. 1951. While the paper is not concerned primarily with Lepidoptera, some pictures of them are shown. Worthwhile information on insect photography. [J.T.]

The Lepidopterists' Society

LIST OF MEMBERS

December 1954

(Compiled by ALICE L. HOPF)

The list is arranged alphabetically by nations within each continental area, and by states or provinces in the U. S. A. and Canada. State, province, and nation names are here omitted in the address of each member. The address is followed by the lepidopterological interests. Where only "RHOP.", "MACRO.", or "MICRO." appears, the interest is general within the respective group. "LEPID." is used where interests include all three of the above groups. Following the interests among taxonomic groups are the other aspects of lepidopterology in which the member is interested. The member's name preceded by an asterisk (*) indicates Charter Membership; his name in capital letters indicates Sustaining Membership. The word "Nearctic" here means America north of Mexico. For uniformity "Noctuidæ" issued for all cases, even though the equivalent name "Phalænidæ" had been placed on the membership card by some members. Similarly, *Speyeria, Boloria,* etc. are used for the Nearctic species formerly placed in *Argynnis, Brenthis,* etc. The following abbreviations are used:

LEPID.	— All Lepidoptera	esp.	— especially
RHOP.	— Rhopalocera (butterflies)	Coll.	— Collection
MACRO.	— Macroheterocera (moths)	Ex.	— Exchange
MICRO.	— Microlepidoptera (moths)		

Please do not write any member on this list, asking him to exchange specimens, unless "Ex." is stated after his name.

HONORARY LIFE MEMBERS

"Individuals, not exceeding ten in number, who have made important contributions to the science of lepidopterology, may be elected Honorary Members of the Society."

(Constitution, Art.III, Sec.7.)

Brig. W. H. EVANS, Department of Entomology, British Museum (Natural History), London S.W. 7, England, U.K. (Hesperiidæ)

*Prof. WM. T. M. FORBES, Commander Hotel, Cambridge 38, Mass., U.S.A. (Lepidoptera: Classification; Biogeography)

*Dr. KARL JORDAN, Zoological Museum, Tring, Herts., England, U.K. (Papilonidæ, Sphingidæ, Saturniidæ)

*Dr. JAMES H. McDUNNOUGH, Nova Scotia Museum of Science, Halifax, N.S., Canada. (Microlepidoptera, esp. Coleophoridæ)

AFRICA

BELGIAN CONGO

SEYDEL, CHARLES, B.P. 712, Elisabethville. LEPID: esp. African. Coll. Sell.

GOLD COAST

Johnson, F.L., United Africa Co., Ltd., P.O. Box 22, Akim-Oda. RHOP: of world, esp. Papilionidæ (esp. *Troides* [=*Ornithoptera*]) and *Charaxes* (African).

KENYA

Van Someren, V.G.L. (Dr.), Box 1682, Nairobi. LEPID. of Africa. Coll.

LIBERIA

Fox, Richard M. (Dr.), Liberian Institute, Harbel. RHOP: esp. Ithomiidæ. Comparative anatomy of insects.

SOUTH AFRICA

Clark, Gowan C., 69 Pearson St., Port Elizabeth. African Rhop.: Life History.
Van Son, G. (Dr.), P.O. Box 413, Transvaal Museum, Pretoria. RHOP: esp. Papilionidæ, Pieridæ, Nymphalidæ. MACRO. Coll. Ex. Rear.

UGANDA

Sevastopulo, D.G., Box 401, Kampala. RHOP. MACRO. Life History, Genetics. Coll. Ex.

ASIA AND INDOAUSTRALIA

AUSTRALIA

Burt, William, 19 James St., Dandenong, Victoria. LEPID. Coll. Ex.
Common, Ian F.B., Div. of Entomology, C.S.I.R.O., P.O. Box 109, City, Canberra, A.C.T. MACRO: Australian Noctuidæ. MICRO: Australian Torticidæ. Life History, Behavior, Migration. Coll.
Holmes, David R., "Holmden", Red Hill, Victoria. RHOP. MACRO. Coll. Ex.

INDIA

Shull, Ernest M., Ahwa, via Billimora, Dangs District, B.P.

INDONESIA

Sollaart, A., Medang Ara Estate, Kwala Simpang, Sumatra Timur.
Wegner, A.M.R., Museum Zoologicum Bogoriense, Bogor.

JAPAN

Azuma, Masao (Prof.), 27/0 Kamiyoshihara-machi, Nishinomiya, Hyogo Pref. MACRO: esp. Geometridæ. MICRO: esp. Pyralididæ. Life History, Distribution. Coll. Ex.
Fujioka, Tomoo, Ho-13, 10 Nishikata-machi, Bunkyo-ku, Tokyo.
Futo, Miyuki, No. 2 of 19, Kamashinyashika-cho, Hikone, Shiga Pref. RHOP. Coll. Ex. Rear.
Hayano, Ikuo, 337 Shinohara-cho, Kohoku, Yokohama.
Inoue, Hiroshi, Eiko Gakuen, Jesuit High School, Funakoshi-Machi, Yokosuka, MACRO: esp. Geometridæ, Cymatophoridæ, Drepanidæ. Life History. Coll. Ex.
Iwase, Tarô, 4 Shinhana-cho, Hongo, Tokyo. RHOP. Life History, Migration.
Kuzuya, Takeshi, Minami-Sonomachi 1-3, Nakaku, Nagoya.
Nakayama, Masaki, 1-398 Fujihonmachi, Wakamatsu-city, Fukuoka Pref., Kyushu. RHOP. esp. Papilionidæ, Pieridæ, *Parnassius, Anthocaris,* etc. Life History, Distribution. Coll. Ex.
Ogata, Masami (Dr.), Ogata Hospital, No.18, 3-chome, Imabashi, Higashi-ku, Osaka. RHOP: esp. Hesperiidæ. MACRO: Agaristidæ, Arctiidæ. Genitalic studies. Coll. Ex.
Okada, Yoshio, Yanagida-Cho, Saga, Kyoto. RHOP: esp. Papilionidæ, Satyridæ, Lycænidæ. Biogeography, Morphology. Coll. Ex.
Shirôzu, Takashi (Prof.), Biol. Lab., General Education Dept., Kyushu University, Fukuoka. RHOP. Life History, Food Plants, Distribution. Coll.
Takahashi, A., 70, 1-chome Shoeicho, Mizuho-ku Nagoya.
Watanabe, Masato, 620 Ishizu-cho, Sakai, Osaka. RHOP. Coll. Ex. Buy. Sell.
Yano, Yukio, c/o Konodai High School, Konodai-machi, Ichikawa, Chiba Pref. RHOP. MACRO. Variation, Behavior. Coll. Ex.

PHILIPPINES

SUSON, F.M., 121 Bonifacio St., Cebu City. RHOP. Coll. Ex.
Uichanco, Leopoldo B. (Dr.), Dean of College, Laguna. RHOP. Distribution. Coll.

EUROPE

AUSTRIA

Klimesch, Joseph, Linz a.d. Donau, Donatusgasse 4. LEPID: esp. *Nepticula, Coleophora,* and other leaf miners. Life History, Genetics. Coll. Ex. Sell.
Wilcke, Hermann (Dr.), Kössen/Tyrol Nr. 199. RHOP. MACRO: esp. Noctuidæ, Geometridæ. Coll. Sell.

BELGIUM

Berger, Lucien, 2 Vallée des Artistes, Linkebeek-lez-Bruxelles. LEPID.
*Kiriakoff, S.G., Zoological Labs., Ghent University, 14 Universiteitsstraat, Ghent. RHOP: esp. Belgian Congo. MACRO: esp. Noctuoidea, Thyretidæ. MICRO: esp. Pyralididæ. Phylogeny, Classification. Ex.

CZECHOSLOVAKIA

Cejp, Karel (Prof.Dr.), Botanical Institut, Charles University, Benáská 2, Praha II. LEPID. Entomophytous fungi. Coll. Ex.
Losenicky, Zdeněk, Chálenická 38, Plzen I. RHOP. MACRO. Coll. Ex.
Moucha, Josef, Dusni 6, Praha 1.
Poláček, V.B., ul. Komenského, 601/I., Brandýs nad Labem. RHOP.
Povolný, Dalibor (Dr.), Instit. of Applied Entomology, Brno, Zemědělská 1. LEPID. of central Europe: esp. *Zygæna, Lithocolletis.* Coll. Ex.
Šmelhaus, Jiří, Bělského 4, Praha 7.

DENMARK

Andersen, Axel, Odensegade 7, Ø, Copenhagen. Biology, Distributional Factors. Coll. Ex. Sell.
*Christensen, Georg, Parmagade 24, III, Copenhagen S. RHOP: esp. *Argynnis, Phyciodes, Erebia.* Genetics. Coll. Ex.
Hoffmeyer, Skat (Dr.), Bishop of Aarhus, Aarhus. LEPID. of northern Europe. Biology. Coll.
Langer, T.W. (Cand. Mag.), Horsholmsvej 77, Rungsted Kyst.

FINLAND

Hackman, Walter (Dr.), Parkgatan 5, Helsingfors. RHOP. and MACRO. of Scandinavia. MICRO. of Holarctic region, esp. Coleophoridæ, Gelechiidæ (*Phthorimæa*). Systematics, Distribution. Coll.
Kaisila, Jouko, Zoological Institute of University, P. Rautatiek. 13, Helsinki.
Krogerus, Harry (Dr.), Mannerheimvägen 25A, Helsingfors. LEPID: esp. Tortricidæ, and Canadian fauna. Coll. Ex.
Suomalainen, Esko (Prof.Dr.), Institute of Genetics, The University, P. Rautatiek. 13, Helsinki. LEPID. of Scandinavia. Genetics. Cytology.

FRANCE

Berjot, Etienne E., Villa "Pax", St. Martin de Crau, (Bouches du Rhone). RHOP. MACRO. Life History. Coll. Ex.
Bourgogne, Jean, Muséum d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5e. RHOP. MACRO: esp. Psychidæ (Palæarctic and African). Life History, Morphology, Biology. Coll. Ex.
Dujardin, F., 25 rue Guiglia, Nice (Alpes-Maritimes). Lycænidæ, Zygænidæ. Zoogeography. Coll. Ex.
Gaillard, François, 5 Cité du Midi, Paris 18e. RHOP. MACRO. Coll. Ex. Buy.
Herbulot, Claude, 31 Ave. d'Eylau, Paris 16e. MACRO: esp. Geometridæ. Coll. Ex. Buy.
LeCharles, Louis, 22 Avenue des Gobelins, Paris V. RHOP. MACRO: esp. Zygænidæ MICRO: Crambidæ esp. *Crambus.* Biology. Coll. Ex.
deLesse, Hubert, Laboratoire d'Entomologie, 45 bis rue de Buffon, Paris 5e. RHOP: esp. Nymphalidæ, Satyridæ (*Erebia*). Coll. Ex.
Muspratt, Vera Molesworth (Mme.), Aïcé Choko St. Jean-de-Luz, Basses Pyrénées. RHOP. MACRO. Life History, Migration. Coll. Ex.

*Stempffer, Henri, 4 rue Saint Antoine, Paris 4^e. RHOP: esp. Lycænidæ (Holarctic and African). Coll. Ex.

Varin, Gilbert, 4 Ave. de Joinville, Joinville-le-Pont (Seine). RHOP: Nymphalidæ, Satyridæ. Subspeciation, Distribution. Coll. Ex.

Viette, Pierre E.L., Muséum Nat. d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5^e. MICRO: esp. Homoneura (Micropterygidæ, Eriocraniidæ, Hepialidæ). ♂ genitalia. Coll. Ex.

GERMANY

Amsel, H.G. (Dr.), (17b) Buchenberg bei Peterzell/Baden.

Busch, Theo, (22b) Niederadenau, über Adenau/Eifel. RHOP: esp, *Melitæa.* Life History. Coll. Ex.

Cretschmar, Max (Dr.), Casselstr. 21, (20) Celle Hann.

Forster, Walter (Dr.), Menzingerstrasse 67, München 38, (American Zone). RHOP: esp. Lycænidæ. MACRO. Zoogeography. Coll. Ex.

Hering, Erich M. (Prof.Dr.), Berlin N.4, Invalidenstr. 43, Zoologisches Museum. MACRO: Pericopidæ, Zygænidæ, Dioptidæ, etc. MICRO: leaf-miners of all orders. Coll. Ex.

Hesselbarth, Gerhard, (23) Diepholz (Hann.), Hindenburgstr. 13. Palæarctic RHOP. and MACRO: esp. Papilionidæ, Pieridæ, Bombyces, Arctiidæ. Life History, Zoogeography. Coll. Ex.

Jäckh, Eberhard, Haydn Platz 11, Bremen. LEPID: esp. Micros. Life History. Coll. Ex.

Kampf, Ari W., Franz Jurgens Strasse 12, Düsseldorf 10. RHOP. and MACRO: African, esp. *Cymothoe* and *Charaxes.* Coll. Ex. Buy. Sell.

de Lattin, Gustaf J. (Dr.), Geilweilerhof, Post Siebeldingen (22a) über Landau/Pfalz, Forschungsinstitut f. Rebenzüchtung. RHOP: Holarctic, esp. Satyridæ. MACRO: Holarctic, esp. Acronictinæ and Bryophilinæ. MICRO: esp. Palearctic. Distribution, Evolution, Genetics. Coll. Ex.

Speyer, W. (Dr.), Kitzeberg ü. Kiel.

Warnecke, Georg (Landgerichtsdirektor), Hohenzollernring 32, Hamburg-Altona. Palæarctic RHOP. and MACRO: esp Geometridæ. Migration, Zoogeography. Coll.

HUNGARY

Gozmány, Lancelot A. (Dr.), Széll Kálmán tér. 13, Budapest XII. MICRO. Helophil Moths. Coll. Ex. Sell.

Issekutz, László (Dr.), Feherhajó- U. 8/10, Budapest V. LEPID. Life History.

Kovács, L. (Dr.), Budapest XII. Kléh István u 3/a. III. 1.

Lengyel, Julius F. (Dr.), Budapest XII. Budakeszi ut 38. RHOP: of Europe, esp. *Melitæa.* MACRO: Noctuidæ, esp. *Cucullia.* Distribution, Zoogeography. Coll. Ex.

ITALY

Berio, E. (Dr.), Museo di Storia Naturale, Via Brigata Liguria 9, Genova. MACRO: esp. Noctuidæ. Coll. Ex. Buy.

Hartig, Fred (Pr. Count), Sovrint. Istituto Nazionale di Entomologia, Via Catone 34, Rome.

Parodi, Guiseppe, Via Sebenico 13, Milano.

Verity, Roger R. (Dr.), Caldine (Firenze). RHOP: esp. Palearctic. Coll. Ex. Buy.

MALTA

Valletta, Anthony, 257 Msida St. B, B'Kara. RHOP: esp. Satyridæ and Nymphalidæ. MACRO. MICRO. Coll. Ex.

NETHERLANDS

Diakonoff, A. (Dr.), Rijksmuseum van Natuurlijke Historie, Leiden. MICRO: all except Pyralidoidea. Leaf-miners, Biology, Morphology. Coll. Ex. Buy.

Eisner, Curt, Violenweg 5, Kwekerijweg (The Hague). *Parnassius.* Coll.

Lempke, B.J., Oude Yselstraat 12^{III}, Amsterdam Z-2. RHOP. and MACRO. of Netherlands. Life History.

Roepke, W. (Prof.Dr.), Lab. voor Entomologie, Berg 37, Wageningen. RHOP. and MACRO: esp. Palæarctic and Indomalayan. Life History, Ecology, Genetics, Morphology, Histology, Zoogeography, Systematics.
Straatman, Raymond, 127 Malakkastraat, Den Haag. RHOP. MACRO. Life History, Foodplants, Literature on Indonesian Lepid.

PORTUGAL

da Silva Cruz, Maria A., Quinta de S. João, Candal, Vila Nova de Gaia. RHOP: esp. *Melitæa.* MACRO: esp. Geometridæ. Migration. Coll. Ex.

SPAIN

Agenjo, Ramon, Instituto Español de Entomología, Palacio del Hipódromo, Madrid. LEPID. of Spain. Coll.
Flores Casas, Hilario, Plaza de Lesseps 17, Barcelona. RHOP. MACRO. Coll. Ex. Buy. Sell.
Torres Sala, Juan, 1 Calle Dr. Romagosa, Valencia Palearctic RHOP., World Papilionidæ, Nymphalidæ, Morphidæ. Palearctic MACRO., World Saturniidæ, Uraniidæ, Castniidæ. Life History. Coll. Ex. Buy.

SWEDEN

Bryk, Felix, Riksmuseum, Stockholm 50. RHOP. Nervature, Morphology. MACRO.
Nordström, Frithiof (Dr.), Kungsholmstorg 1, Stockholm. MACRO: esp. Agrotidæ, *Eupithecia.* Life History. Coll.

SWITZERLAND

Lüthi, Adrian J., Inneres Sommerhaus, Burgdorf. RHOP. MACRO: esp. Sphingidæ. Coll. Ex. Buy. Sell.
*Robert, John H., 8 Route de Chancy, Petit Lancy, Geneva. Pieridæ. Coll. Ex. Buy.
Ruetimeyer, Ernest, 38 Rue Fédérale, Berne. RHOP. and MACRO: esp. Papilionidæ, Pieridæ, Danaidæ, Satyridæ, Noctuidæ. Coll. Ex.

UNITED KINGDOM

ENGLAND

Bowden, S.R., 33 South View, Letchworth, Herts. RHOP.: esp. *Pieris* genetics. Coll. Ex.
Chandless, Richard C., Sherrington Manor, nr. Polegate, Sussex. RHOP. MACRO. Life History. Sell.
Clarke, C.A. (Dr.), "High Close", Thorsway, Caldy, Cheshire.
FAGER, EDWARD W. (Dr.), Bureau of Animal Population, Botanic Garden, High Street, Oxford. RHOP: esp. Theclinæ. Coll. Ex. Buy.
*Ford, E.B. (Dr.), University Museum, Oxford. LEPID. Genetics. Coll.
Hards, Charles H., 40 Riverdale Road, Plumstead, London, S.E. 18. English and American RHOP. and MACRO: esp. *Catocala,* Saturniidæ. Life History, Migration, Distribution, Variation. Coll. Ex.
HELEY, ROBERT G., "Lygoes", Burcott, Wing, Leighton Buzzard, Beds. RHOP: of world, esp. Pieridæ, Nymphalidæ, Papilionidæ. MACRO: esp. Saturniidæ. Distribution, Mimicry. Coll. Ex. Buy. Sell.
Hemming, Francis, 28 Park Village East, Regent's Park, London N.W. 1. RHOP: esp. Palæarctic and Nearctic. Coll. Ex. Buy.
Hinton, H.E., (Dr.), Dept of Zoology, University of Bristol, Bristol. Phylogeny, Physiology. Coll. (larvæ).
*Riley, Norman D., 7 McKay Road, London S.W. 20. RHOP.
Smith, P. Siviter, 21 Melville Hall, Holly Road, Edgbaston, Birmingham 16. RHOP: esp. *Lycæna.* Coll. Ex. Buy.
Tams, W.H.T., Dept. of Entomology, British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7. MACRO: esp. Lasiocampidæ, Agrotidæ. MICRO: esp. Pyralididæ, Tinæidæ. Life History.
Warren, Brisbane C.S., 3 Augusta Mansions, Folkestone, Kent. RHOP: esp. Satyridæ, Nymphalidæ. Life History, Distribution. Coll.
Williams, C.B. (Dr.), Rothamsted Experimental Station, Harpenden, Herts. Migration, Populations, Ecology. Coll. Ex.

SCOTLAND

Rockingham, N.W. (Lt.Comm.), Lower Seton, North Berwick, East Lothian. RHOP. MACRO. Migration. Coll. Ex.

YUGOSLAVIA

Lorković, Z. (Prof.Dr.), Medical Faculty, Zagrebian University, Zagreb.

LATIN AMERICA

ARGENTINA

Bourquin, Fernando F., Calle Conde 1639, Buenos Aires. LEPID: Life History only. Coll.

Breyer, Alberto, Maipu 267, Buenos Aires. RHOP. and MACRO: Argentine only. Coll.

Hayward, Kenneth J. (Prof.), Miguel Lillo 205, Tucumán. RHOP.: Neotropical (esp. Argentine) and Hesperiidæ.

Orfila, Ricardo N. (Dr.), Casilla Correo 2.-Suc.28, Buenos Aires. Neotropical LEPID: esp. Noctuoidea, Tortricoidea. Coll. Ex.

Pastrana, José A., Solis 370, Buenos Aires. MICRO: esp. Pyralidoidea, Tortricoidea. Coll. Ex.

Yivoff, León, Bouchard 1840, Adrogué, F. C. Grl. Roca, (Prov. Bs. Aires).

BRAZIL

d'Almeida, Remualdo F. (Dr.), Rua Viana Junier, 25 Encantado, Rio de Janeiro, D.F. RHOP: esp. Ithomiinæ, Pieridæ, Papilionidæ. MACRO: esp. Syntomidæ, Arctiidæ, Sphingidæ, Saturnioidea. Biology. Coll. Ex. Buy.

*Araujo, R.L. (Dr.), Instituto Biológico, Caixa Postal 7.119, São Paulo, S.P. MACRO: esp. Castniidæ, Dalceridæ. Coll. Buy.

Cardoso, Aldo (Dr.), Avenida Teresa Cristina 65, Maceió, Alagoas. LEPID. of the world, esp. Saturnioidea. Ex.

Ebert, Heinz (Dr.), Avenida Pasteur 404, Commissão National da Produção Mineral, Rio de Janeiro. RHOP: Theclinæ and Riodinidæ of world; neotropical Limenitinæ, Charaxinæ, Apaturinæ, Satyridæ. Fauna of Brazil. Ex. Buy.

Kesselring, Jorge, Caixa Postal 6, João, Pessoa, (Paraíba). RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

Oiticia F^{o}., José (Dr.), Rua Alfredo Chaves 59, Rio de Janeiro. RHOP. MACRO: esp. Sphingidæ, Saturniidæ. Morphology. Coll. Ex. Buy.

PEARSON, HENRY R., Caixa Postal 5151, Rio de Janeiro. RHOP: esp. Nearctic Papilionidæ. MACRO: esp. Saturniidæ, Sphingidæ, Mimallonidæ. Life History, Food Plants, etc. Coll. Ex. Buy.

Travassos, Lauro (Prof.), Instituto Oswaldo Cruz, Laboratório de Helmintologia, Caixa Postal 926, Rio de Janeiro, D.F. MACRO: esp. Arctiidæ, Adelocephalidæ. Coll. Ex.

Travassos F^{o}., Lauro (Dr.), Dept. of Zoologia, Secr. da Agricultura, Caixa Postal 7172, São Paulo. MACRO: esp. Ctenuchidæ, Pericopidæ, Castniidæ. Life History. Coll. Ex.

BRITISH WEST INDIES

Bellinger, Peter F. (Dr.), University College of the West Indies, Mona, St. Andrew, Jamaica. LEPID. Coloration, Genetics. Coll. Ex.

Lewis, C. Bernard, Science Museum, Institute of Jamaica, Kingston, Jamaica. RHOP: esp. of Jamaica and Cayman Island. Coll.

Perkins, Lilly G., Sunnybank, Claremone, St. Ann, Jamaica. RHOP. MACRO: esp. Sphingidæ. Sell.

CHILE

Herrera González, José (Prof.), Lo Ovalle 0195, Santiago. RHOP: esp. Pieridæ, Nymphalidæ, Satyridæ. Genitalia, Genetics. Coll. Ex.

CUBA

de la Torre y Callejas, S.L. (Dr.), Universidad de Oriente, Santiago de Cuba, Oriente. RHOP: esp. *Eurema*. Coll. Ex.

MEXICO

Escalante, Tarsicio (Dr.), Av. Cuitlahuac 63, Mexico 17, D.F.
WELLING, EDWARD C., La Casa Victoria, Chichen Itzá, Yucatán. RHOP. MACRO. Coll. Sell.

VENEZUELA

Lichy, René (Prof.), Edificio ENKA, Apto. 17, Avenida Fermin Toro, San Bernardino, Caracas. RHOP: Venezuelan only, esp. *Eurema.* MACRO: esp. Sphingidæ of the world. Zoogeography, Ecology. Coll. Ex. Buy.

NORTH AMERICA

CANADA

ALBERTA

BOWMAN, KENNETH, 10240 Wadhurst Rd., Edmonton. LEPID. of Alberta Coll.
WYATT, COLIN W., Box 217, Banff. RHOP: Palearctic and Nearctic, esp. Alpine and Arctic spp. Local Races. Coll. Ex. Buy. Sell.

BRITISH COLUMBIA

*Fitch, Richard J., 2235 Pandora St., Vancouver. Arctic LEPID. Sell.
*Guppy, Richard, R.R. 1, Marine Drive, Wellington. RHOP. MACRO. Coll. Sell. Rear.

MANITOBA

Bird, Charles D., 1930 Rosser Ave., Brandon. RHOP: esp Satyridæ. MACRO. Coll. Ex. Sell.
POLUSNY, JOHN, 641 Martin Ave., Winnipeg. RHOP. MACRO. esp. Nearctic. Coll. Ex. Sell.
*Quelch, C.S., Transcona. LEPID: esp. Central and S. American. RHOP. Coll. Ex.

NOVA SCOTIA

*Ferguson, Douglas C., Nova Scotia Museum of Science, Halifax. RHOP: Nearctic. MACRO: Nearctic, esp. Geometridæ, Noctuidæ. Coll. Ex. Buy.

ONTARIO

Bailey, Earl G., 34 Tecumseh St., St. Catharines, RHOP. MACRO. Coll.
*BRUGGEMANN, Paul F., 335 Science Service Bldg., Ottawa. RHOP. MACRO: esp. Geometridæ, Hepialidæ. Life History. Coll. Ex. Buy. Sell.
Dillon, Tom, 28 Centre St., Elmira. RHOP. MICRO. Coll. Buy. Rear.
*Freeman, Thomas N. (Dr.), Div. of Entomology, Science Service Bldg., Ottawa. RHOP: esp. of Arctic. MICRO. Coll. Rear.
*Hardwick, David F., Div. of Entomology, Science Service Bldg., Ottawa. MACRO: esp. Noctuidæ. Coll. Ex. Buy. Rear.
Harrington, Peter T., 88 Heddington Ave., Toronto. RHOP: Papilionoidea of N. Amer.; Papilionidæ, Danaidæ and Heliconiidæ of world. Coll. Ex. Buy. Rear.
Lambert, Robert (Dr.), Systematic Entomology, Science Service, Ottawa. MICRO: esp. Tortricidæ. Forest Lepidoptera, Biology. Coll.
McKay, Margaret (Miss), Div. of Entomology, Science Service Bldg., Ottawa. LEPID. larvæ.
*Munroe, Eugene G. (Dr.), Div. of Entomology, Science Service Bldg., Ottawa. RHOP. MACRO. MICRO: esp. Pyralididæ and related families. Coll. Ex. Buy. Rear.
Reiter, Raymond, 851 Manning Ave., Toronto 4. RHOP: esp. Papilionidæ, Nymphalidæ. esp. *Catocala,* Saturniidæ. MACRO: Coll. Ex. Buy. Sell. Rear.
Riotte, J.C.E. (Rev.), Box 536, Geraldton. Holarctic Sphingidæ. All LEPID. of N.W. Ontario. Coll. Rear.
ROGERSON, JOHN L., 30 First Ave., Coniston. RHOP. Coll. Ex. Buy. Rear.
Syme, Paul D., 262 Bessborough Drive, Toronto 17. LEPID., esp Ontario. Coll. Ex.
*Vogel, Harold A., R.R. #5, London. RHOP. MACRO. Coll.
Wigmore, R. H., Room 107, Science Service Bldg., Carling Ave., Ottawa. MACRO: esp. Noctuidæ. Coll. Ex.
Winters, John, R.R. 4, Embro. RHOP. MACRO. Systematics, Nomenclature. Coll. Ex. Buy. Sell.

QUEBEC

*Adelphe, (Rev. Brother), École Supérieure Richard, Verdun. RHOP: esp. of eastern Canada. MACRO: esp. Noctuidæ of east. Canada. Coll.

*GRAY, P.H.H. (Dr.), Box 236, Macdonald College. Local LEPID. Biology. Coll.

*Sheppard, Arthur C., 5554 Coolbrook Ave., Montreal 29. LEPID: of Quebec only. Coll. Ex. Sell. Rear.

SASKATCHEWAN

Hooper, Ronald, Somme. RHOP. Coll.

SHAW, J.P., Box 1056, Weyblurn. RHOP. MACRO. esp Saturniidæ. Coll. Buy. Rear.

UNITED STATES OF AMERICA

ALABAMA

*Chermock, Ralph L. (Dr.), Box 2047, University of Alabama, University. RHOP: esp. Satyridæ. Taxonomy. Coll.

ARIZONA

Werner, Floyd G. (Dr.), Dept. of Entomology, University of Arizona, Tucson. MACRO. & MICRO. of Arizona. Coll. (Determinations needed).

CALIFORNIA

Baber, Donald L., 1511 Drake Ave., Burlingame. RHOP: esp. Neotropical Papilionidæ, Nymphalidæ. Coll. Ex.

Baker, Nelson W., 279 Sherwood Drive, Santa Barbara.

*BAUER, WILLIAM R., 235 Liberty St., Petaluma. MACRO. esp. Noctuidæ, Geometridæ. Coll. Ex.

Blackman, Thomas M., P.O. Box 125, Perris RHOP. MACRO. Coll. Ex. Rear.

Braviroff, Harry, 1170 "E" St., San Bernardino. LEPID. esp. exotic. Buy.

Burdick, William N., 1108 S. Harvard Blvd., Los Angeles 6. RHOP of Rocky Mts. and West only. Coll. Ex. Buy.

Clayton, Roderick K. (Dr.), Dept. of Physics, U.S. Naval Postgraduate School, Monterey. RHOP. MACRO. Genetics and physiology. Coll. Ex. Buy.

*Comstock, John A. (Dr.), P.O. Box 158, Del Mar. LEPID. Life History. Rear.

Coy, L.P. (Dr.), 328 West Bellevue, San Mateo. RHOP. Coll. Ex.

*CRICKMER, NOEL, P.O. Box C, Borrego Valley, Borrego Springs. LEPID. esp. Geometridæ. Coll.

*Davies, Thomas W., 791 Elsie Ave., San Leandro. RHOP. MACRO. Coll. Ex. Buy. Sell.

Day, W. C., 1021 Hubert Rd., Oakland 10 Phylogeny, Speciation, Distribution, Biology. Coll.

*Downey, John C., Zoology Dept. University of Calif., Davis. RHOP: esp. Lycænidæ. Coll. Ex

Essig, E.O. (Prof.), 112 Agriculture Hall, University of California, Berkeley 4. LEPID: esp. of western North America. Coll.

*Evans, William H., 8711 la Tuna Canyon Road, Sun Valley. RHOP. MACRO. esp. *Annaphila,* Heliothiinæ. Life History, Photography. Coll. Sell. Rear.

*Ford, Robert J., 3266 Ardmore Ave., South Gate. LEPID. esp. Riodinidæ, Lycænidæ, Arctiidæ, Zygænoidea, Pyralidoidea. Coll. Ex. Rear.

Freeman, Walter H., Rt. #3, Academy, Box 190, Camarillo. RHOP. MACRO. Coll. Ex. Rear.

GEHRHARDT, EDGAR E., 456 18th St., Richmond 5. RHOP. MACRO: esp. Sphingidæ. Coll. Ex. Buy.

*Guedet, Edward F. (Rev.), 1818 Eddy St., San Francisco 15. MACRO: esp. Geometridæ. Coll. Ex. Buy.

*Hammer, William A., 1923 Evergreen Ave., San Leandro. RHOP: esp. *Speyeria, Colias, Œneis.* MACRO. Coll. Ex. Buy.

HARLICK, ROBERT M., 2159 33rd Ave., San Francisco 16.

Hill, Charles, 1350 San Luis Rey Drive, Glendale 8. MACRO: esp. Noctuidæ of western Nearctic region. Coll. Ex. Buy.

Hogue, Charles L., 1591 Grandola Ave., Los Angeles 41. MACRO: esp. Arctiidæ. Literature, Illustrating. Coll. Ex. Buy. Sell. Rear.

*Hovanitz, William (Prof.), Dept. of Biology, University of San Francisco, San Francisco 17. RHOP. Genetics, Geographical Variation.

*Hulbirt, Lowell H., 622 N. Bright Ave., Whittier. RHOP: esp. Lycænidæ, Hesperiidæ. Coll. Ex.
K and K Butterfly Hobbyist, 119 1/2 W. Wilson, Glendale.
*KIRKWOOD, CARL W., Box 47, Summerland. MACRO. esp. Geometridæ. Coll. Ex. Buy.
La Due, Noel L., 1712 41st St., Sacramento 19. LEPID: esp. *Zerene.* Coll. Ex.
Lange, W. Harry (Dr.), Dept. Entomology, University of California, Davis. MICRO: esp. Pterophoridæ and aquatic Pyralididæ. Coll. Ex. Buy.
LANGSTON, ROBERT L., 3 Arlington Ave., Berkeley 5. RHOP. MACRO. of western Nearctic. MICRO: esp. Zygænoidea. Coll. Ex. Rear.
Laspe, Charles G., 1 Middleridge Lane No., Rolling Hills. RHOP: esp. Papilionidæ. Coll. Ex.
Linsdale, Donald D., Jamesburg Route, Carmel Valley. RHOP. MACRO. Coll.
Macheboeuf, Charles, Kelseyville. RHOP. MACRO. Coll. Ex. Buy. Sell. Rear.
*McHENRY, PADDY, 1032 E. Santa Anita, Burbank. Original Descriptions and their Publication Dates. Coll.
MacNEILL, C. DON, Dept. of Entomology, 112 Agriculture Hall, University of California, Berkeley 4. RHOP. esp. Hesperioidea. Coll. Ex. Buy.
*MARTIN, LLOYD M., Los Angeles County Museum, Exposition Park, Los Angeles 7. Southwestern LEPID: esp. Acontiinæ, Notodontidæ, Hesperioidea. Coll. Ex. Rear.
*Mattoni, R.H.T., Dept. of Botany, University of California, Los Angeles 24. RHOP: esp. Glaucopsychinæ of the world. Coll. Ex. Buy.
Minahan, Roger P., 8372 E. Westminster Ave., Westminster. LEPID: esp. moths. Ecology, Genetics, Life History, Parasitology.
Neumann, D., Jr., 3066 Georgia St., Oakland 2. Literature. Sell.
Opler, Paul A., 415 Beatrice Rd., Pleasant Hill. RHOP: esp. *Speyeria, Papilio, Apodemia, Lycæna.* MACRO. Coll. Ex. Rear.
PATTERSON, DONALD, 170 Glenwood Ave., Atherton. RHOP. Coll.
POWELL, JERRY A., 2714 Ridge Road, Berkeley. RHOP: esp. of Southern and Lower Calif. Coll. Ex. Sell.
Pronin, George F., 516 Cole St., San Francisco 17.
REES, WILLIAM A., 934 So. McDonnell Ave., Los Angeles 22. MACRO: esp. *Euxoa, Oncocnemis, Zale.* MICRO. Coll. Ex. Buy. Sell.
Reichart, George B., 5929 Wood Drive, Oakland 11. RHOP: esp. *Euphydryas, Melitæa,* Pieridæ; Boreal and Alpine. Coll. Ex. Rear.
*REID, ROBERT H., 442 Franklin Ave., Los Angeles 27. RHOP: esp. Plebeiinæ. MACRO: esp. Heliothiinæ (*Schinia*), North America. Coll. Ex. Buy.
*Roberds, Joseph, 2022 Huntington Lane, Redondo Beach. RHOP: esp. *Papilio, Speyeria, Colias.* Coll. Ex.
Rubbert, Allen, 1915 Terrace Way, Bakersfield. RHOP: esp. *Speyeria, Plebejus,* Pieridæ of southern Calif. Coll.
SALA, FRANK P., 1912 Hilton Drive, Burbank. RHOP. MACRO: esp. Saturniidæ, *Catocala,* Noctuidæ. MICRO: esp. Ægeriidæ, Cossidæ. Life History. Coll. Ex. Sell.
SAMUELSON, G. ALLAN, 3824 Walnut Ave., Concord. Nearctic RHOP. and MICRO. Coll. Ex. Rear.
Schmela, Dora E. (Mrs.) 2883 Grove St., Ventura. RHOP. Coll.
Smith, Arthur C., P.O. Box 411, Berkeley. RHOP. and MACRO. of Mexico and Southwestern U.S.A. Ecology, Distribution. Coll. Ex. Buy. Sell.
Smoker, Samuel R., 105 Topeka Ave., San Jose, Calif.
Steinhoff, Gordon R., 3916 Oak St., Burbank. RHOP. Coll. Ex. Buy.
Stoddard, Terry, 12343 Magnolia St., El Monte.
Stoner, Emerson A., 285 East "L" St., Benicia. RHOP. Coll. Ex.
*THORNE, FRED T., 1360 Merritt Drive, El Cajon. RHOP: esp. Theclinæ. Ecology—southwestern states. Coll. Ex. Rear.
*TILDEN, J.W. (Dr.), 125 Cedar Lane, San Jose 27. RHOP: esp. Hesperiidæ, Lycænidæ. MICRO. Ecology. Coll. Ex. Rear.
*Weber, Bernie H., 359 E. Angeleno Ave., Burbank. RHOP. Coll. Ex.
Wittman, Richard N., 2748 Ritchie St., Oakland. RHOP. Coll.

COLORADO

*BROWN, F. MARTIN, Fountain Valley School, Colorado Springs. RHOP: esp. Pieridæ and Satyridæ of neotropics. Distribution. Coll. Ex. Buy.
*Eff, J. Donald, 820 Grant St., Boulder. RHOP: esp. *Melitæa, Euphydryas,* and Arctic species. Coll. Ex. Sell.

JAE, RAYMOND J., 1286 So. Umatilla St., Denver. RHOP: esp. *Thecla, Neozephyrus, Strymon* of world. Coll. Ex.
MARSTON, NORMAN L., Hartman. LEPID: esp. Arctiidæ, *Acronycta, Erynnis.* Genitalia. Coll. Ex.
MAY, J.F., Lytle Star Route, Colorado Springs. Arctiidæ of world. Coll. Ex.
MINOR, W.C., P.O. Box 62, Fruita. RHOP: esp. Rocky Mt.. fauna. MACRO. Coll. Ex. Buy. Sell.
*Renk, John J. (Brother), Regis College, W. 50th and Lowell Blvd., Denver 11 RHOP: esp. Lycænidæ. Coll. Ex.
Rotger, Bernard (Rev.), Pagosa Springs. RHOP: esp. of Colorado. MACRO. Coll. Ex. Buy. Sell.

CONNECTICUT

Austin, George T., 99 May St., New Britain. RHOP. MACRO. Coll.
Bakeless, John (Dr.), Great Hill. Seymour. RHOP. of Northeastern U.S. Coll.
Beall, Geoffrey (Dr.), Dept. of Mathematics, University of Connecticut, Storrs. RHOP. Migration.
Brower, Lincoln P. & Jane VZ., Osborn Zoological Lab., Yale University, New Haven 11. Biol. of Lepid. Mimicry. Coll.
Coutsis, John G., Yale Station, New Haven 11. RHOP: esp. of Greece and West Indies. Coll. Ex. Rear.
HARTMAN, W.D. (Dr.), Peabody Museum of Natural History, Yale University, New Haven 11. RHOP.
*HESSEL, SIDNEY A., Nettleton Hollow Rd., Washington. RHOP. MACRO: esp. *Papaipema, Catocala.* Coll. Rear.
Pease, Roger W., Jr., 6 Trumbull St., New Britain. RHOP. MACRO. of U.S., Korea, Japan. Coll. Ex. Rear.
*Remington, Charles L. (Prof.), Osborn Zool. Lab., Yale University, New Haven 11. LEPID: esp. *Colias, Limenitis, Papilio.* Genetics, Mimicry, Phylogeny, Larvæ, Pupæ. Coll. Ex. Buy. Rear.
*Remington, Jeanne E. (Mrs.), Osborn Zoological Lab., Yale University, New Haven 11.
*Schroeter, Otto H., P.O. Box 391, Quaker Hill. RHOP. MACRO: esp. Indo-Australian and So. Amer. Saturniidæ. Coll. Buy. Sell. Rear.
*WILHELM, HERMAN P., Buckingham Rd., Willimantic. RHOP. MACRO. Coll. Ex. Buy. Sell.

DELAWARE

JONES, FRANK MORTON (Dr.), 2000 Riverview Ave., Wilmington. LEPID: esp. Psychidæ. Coll. Ex. Buy.

DISTRICT OF COLUMBIA

*Field, William D., Division of Insects, U.S. National Museum, Washington 25. RHOP: esp. Lycænidæ.

FLORIDA

DAVIDSON, W.M., 1504 Bodell St., Orlando. RHOP: esp. Hesperiidæ, Lycænidæ, Pieridæ. MACRO. Coll. Ex. Rear.
du Brucq, W. J., 157 Lenape Drive, Miami Springs. RHOP. Coll. Ex. Buy. Sell.
*Fuller, Stanley V., Box 81, Cassadaga. RHOP. MACRO: esp. Sphingidæ and Catocalinæ. Life History. Coll. Rear.
*KIMBALL, CHARLES P., Route 4, Box 942, Sarasota. LEPID: esp. Micros. Coll. Ex.
*King, H.L., Box 1171, Sarasota. RHOP: esp. Theclinæ. Coll. Ex.
Stein, George L., 262 Capri Ave., Lauderdale-by-the-Sea. RHOP. MACRO. Zoogeography. Coll. Buy. Rear.
Sweetman, Harry E., Box 518, DeBary. RHOP. and MACRO: esp. of central northwest U.S.A. Life History. Coll. Ex. Buy. Sell.

GEORGIA

*HARRIS, LUCIEN, JR., P.O. Box 167, Avondale Estates. RHOP. MACRO. Coll.
Harris, Lucien, III, 2284 Pembrook Place, N.E., Atlanta. RHOP. Coll.
NAUMANN, FRED T., P.O. Box 226, Forsyth. Life History.
*TOWERS, ABNER A., 2421 Sagamore Drive N.W., Atlanta. RHOP. and MACRO: Nearctic only. Coll. Ex.

HAWAII

*Calkins, Virgil F., P.O. Box 461, U.S. Immigration-Naturalization Service, Honolulu 9, Oahu. RHOP: Nearctic. MACRO: esp. Saturniidæ, Sphingidæ, Ceratocampidæ, *Catocala.* Coll. Buy. Sell.

SETTE, OSCAR E., 4490 Aukai Ave., Honolulu, Hawaii, T.H.

IDAHO

Manning, James H., 1515 N. 26th, Doise. RHOP.

†WILSON, KENT H., 823 East "B" St., Moscow. RHOP: esp. Papilionidæ. MACRO: esp. *Catocala.* Jugatæ. Life History. Coll. Ex. Buy.

ILLINOIS

ALLYN, A.C. Jr., 1201 Sheridan Rd., Evanston. RHOP: esp. *Charaxes, Papilio, Morpho.* Coll. Ex. Buy.

ANHILGER, CARL, 5938 W. Chicago Ave., Chicago 51. RHOP: esp. *Papilio, Troides (=Ornithoptera),* etc. Coll. Ex. Buy.

Arbogast, Richard T., 1216 S. High Ave., Freeport. RHOP. MACRO. Coll. Ex. Buy. Rear.

*BRISTOL, MAURICE L., 511 May St., Elgin. RHOP: esp. *Thecla.* MACRO: esp. *Apantesis, Catocala,* Noctuidæ. Coll. Ex. Buy. Rear.

Conway, Patrick J., R.R. #3, Box 127, Aledo. RHOP: esp. Satyridæ, *Speyeria, Boloria, Melitæa, Euphydryas.* Coll. Ex. Rear.

Crowder, George L., 913 S. Hamilton, Marissa. Neotropical RHOP: esp. Papilionidæ. MACRO. Coll. Buy. Rear.

DLUHY, EUGENE, 3912 N. Hamilton Ave., Chicago 18. RHOP: esp. *Papilio.* MACRO: esp. Saturniidæ. Coll. Ex. Buy. Sell. Rear.

Fryxell, Thomas, 1331 42nd Ave., Rock Island. RHOP. Coll. Ex.

FULTON, MACDONALD (Dr.), Dept. of Bacteriology, Loyola School of Medicine, 706 S. Wolcott Ave., Chicago 12. RHOP. Coll. Ex.

*Gerhard, W.J., Curator of Insects, Chicago Natural History Museum, Chicago 5. RHOP. MACRO.

*GLENN, MURRAY O., 1019 Normal St., Henry. MACRO. MICRO. Coll. Ex. Buy. Rear.

Hagey, Robert H., 2400 Greenwood Ave., Wilmette. LEPID. Coll.

Hayes, Joseph B., 7522 Forest Preserve Drive, Chicago 34. RHOP: esp. Papilionidæ. MACRO: esp. *Catocala,* Saturniidæ, Sphingidæ. Coll. Ex. Buy. Sell. Rear.

*IRWIN, RODERICK R., 411 N. Bloomington St., Streator. RHOP. Coll. Ex. Buy.

Jelinek, Anton, 3900 Diversey Ave., Chicago 47. RHOP: esp. *Morpho.* Ex. Buy. Sell.

Karalus, Karl E., 10411 Diversey Ave., Melrose Park. RHOP: esp. *Troides, Papilio, Agrias.* MACRO. Indo-Australia, Africa. Coll. Ex. Buy. Rear.

Kistner, David H., Dept. of Zoology, University of Chicago, Chicago 37. Speciation and Zoogeography.

Klein, John D., 7629 S. Morgan, Chicago 20. Papilionidæ. Coll. Ex. Buy. Sell.

LEUSCHNER, RONALD, 1172 S. Wenonah Ave., Oak Park. RHOP. MACRO: esp. Noctuidæ, Geometridæ. Coll. Ex. Buy.

Makinson, George L., 7508 S. May St., Chicago 20. RHOP: esp. Papilionidæ. MACRO: esp. Sphingidæ, Saturniidæ. Indo-Malayan. Coll. Buy. Rear.

MERRIAM, Elsey E. (Miss), 4520 Clarendon Ave., Chicago 40.

Oemick, Donald, 11022 Vernon Ave., Chicago 28. RHOP: esp. *Papilio.* MACRO: esp. *Catocala.* Coll. Ex. Buy. Rear.

Phillips, Leonard S., Armour Research Foundation of Ill. Institute of Technology, Biochemistry Dept., 35 W. 33rd St., Chicago 16. RHOP: esp. *Precis, Limenitis.* MACRO: esp. *Catocala.* Coll. Ex. Buy. Sell.

Roth, J. Peter, 8950 S. Oakley Ave., Chicago 20. RHOP. MACRO. Coll. Ex. Buy.

*SCHOENHERR, WILLIAM H., 225 Cedar Ave., Danville. RHOP: esp. Pieridæ, *Papilio.* MACRO: esp. Sphingidæ. Coll. Ex. Buy. Rear.

SICHER, HARRY (Dr.), Loyola University School of Dentistry, 1757 W. Harrison St., Chicago 12. RHOP. Coll.

Smalley, B.L., Jr., 8940 S. Bell. Ave., Chicago 20. RHOP: esp. Papilionidæ. MACRO: esp. Saturniidæ. Coll. Buy.

Steffen, Michael K., 124 N. Foley Ave., Freeport. RHOP: esp. Nymphalidæ, *Papilio,* Hesperiidæ. MACRO. Aberrations. Coll. Ex. Buy.

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†Life Member

Turner, Blair H., 1575 Ashland Ave., Evanston. RHOP: esp. Lycænidæ. Coll. Buy. Rear.

Wilson, Richard C., 8200 Cornell Ave., Chicago 17. RHOP. MACRO. Coll. Ex. Buy. Sell.

*WOODCOCK, H.E., 6115 Newport Ave., Chicago 34. MACRO. MICRO. Coll. Ex. Buy.

*Wyatt, Alex K., 5842 N. Kirby Ave., Chicago 30. RHOP. MACRO: esp. *Eubaphe, Papaipema,* Heliothiinæ. Coll. Ex. Rear.

INDIANA

Aé, Albert, Dept. of Biology, University of Notre Dame, Notre Dame. RHOP: Genetics. Coll.

BADGER, F. SIDNEY, 209 Forest Drive, Kokomo. RHOP. MACRO. Coll. Ex.

Shields, James E., 503 West Sixth St., Marion. RHOP: esp. Papilionidea. Coll. Ex. Rear.

*Young, Frank N. (Prof.), Dept. of Zoology, Indiana University, Bloomington. Rhop. esp. So. Florida. Coll.

IOWA

BOOTH, OLIVER E., 907 Clinton Ave., Des Moines 13. RHOP. esp. Papilionidæ. Coll. Ex. Buy. Rear.

KANSAS

Bancroft, Larry, 1023 S. Main, Ottawa. LEPID. Coll. Ex. Buy.

*Ehrlich, Paul R., Dept. of Entomology, University of Kansas, Lawrence. RHOP: Satyridæ, esp. *Erebia.* Coll. Ex. Buy.

Howe, William H., 822 E. Eleventh St., Ottawa. RHOP: esp. *Papilio, Troides, Morpho.* MACRO: esp. Sphingidæ, Saturniidæ, *Catocala.* Coll. Ex. Buy.

*STALLINGS, DON B., Caldwell. RHOP: esp. *Megathymus.* Speciation. Coll. Ex. Buy. Rear.

Turner, R.C. (Dr.), Caldwell. RHOP. esp. *Megathymus* Life History. Coll. Rear.

KENTUCKY

*Beebe, Ralph, Renfro Valley. MICRO. Coll. Ex.

*Bishop, John A. (Dr.), Jeffersontown. RHOP. Coll. Ex.

*Cook, Carl, Crailhope. Papilionidæ of the world. Coll. Ex. Buy. Sell. Rear.

MERRITT, JAMES R. (Prof.), School of Law, University of Louisville, Louisville 8. RHOP. MACRO. Coll. Ex. Buy. Rear.

Monroe, Burt L., Jr., Ridge Road, Anchorage. RHOP. MACRO. Coll. Ex.

Unseld, James M., Jr., Gravel Switch. RHOP: esp. *Papilio.* MACRO. Coll. Ex. Buy. Sell. Rear.

LOUISIANA

Berg, George H., Room 319, Custom House, New Orleans 16. RHOP: esp. Papilionidæ of world. Coll. Ex. Buy.

MAINE

*BROWER, A.E. (Dr.), 5 Hospital St., Augusta. RHOP: esp. of eastern U.S.A. MACRO: esp. *Catocala.* MICRO: esp. Ægeriidæ. Coll. Ex. Buy. Sell. Rear.

*GREY, L. PAUL, R.F.D., Lincoln. RHOP: Argynninæ only. Coll. Ex. Buy.

MARYLAND

Fales, John H., 1917 Elkhart St., Silver Spring. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.

Ghika, George, 3900 Hamilton St., F 101, Hyattsville. Melanism.

King, E. Richard, 8323 Haddon Drive, Takoma Park 12. RHOP. Coll. Ex.

MacLeod, Ellis G., Dayton. RHOP: *Colias* of eastern U.S.A.: Taxonomy, Distribution, Biology; Interspecific Hybridization.

Meyers, Billy, 8323 Haddon Drive, Takoma Park. RHOP. MACRO. Coll. Ex. Buy.

*ROBINSON, PAUL F., 425 Barnes St., Bel Air. RHOP. Life History, Physiology. Coll.

SIMMONS, ROBERT S. (Dr.), 1305 Light St., Baltimore 30, RHOP. Coll. Ex. Buy. Rear.

MASSACHUSETTS

*Alexander, Charles P. (Prof.), Rernald Hall, University of Massachusetts, Amherst. Classification, Distribution.

Belcher, Harry C., Jr., 133 Hawthorne St., East Weymouth. LEPID. esp. Papilionidæ. Coll. Ex. Buy.
Cady, Michael E., 21 Border St., Dedham. RHOP. MICRO. Coll. Ex. Buy. Rear.
*Carpenter, A.J., 236 Huntington Ave., Boston. RHOP. MACRO. Coll. Buy.
*Coher, Edward I. (Dr.), 12 Harvard Terrace, Allston 34.
Cottrell, Anette B. (Mrs. G.W.,), 70 Lake View Ave., Cambridge 38. RHOP. Coll.
Edwards, Robert L. (Dr.), 46 Lincoln St., Waltham 54. Ecology.
Flint, Oliver S., Jr., Amherst. LEPID. Coll. Ex. Rear.
Hilliard, Stephen S., 25 Beech St., Framingham. RHOP. MACRO. Coll. Ex. Buy.. Sell. Rear.
*Johnston, William M., 383 South St., Jamaica Plain 30. RHOP: of New England. Coll.
Kamp, George W., 44 Holmes Rd., Dedham. RHOP. MACRO. Coll. Ex. Buy.
Knowlton, Carroll B., Jr., 14 Stuart St., Everett 49. RHOP. MACRO. Coll. Ex. Buy. Sell. Rear.
Le Mon, Ivy (Miss), 145 Pinckney St., Boston 14. RHOP. Migration. Coll. Buy.
McCabe, David T., 15 Fiske Rd., Wellesley Hills 82. RHOP: esp. Lycænidæ. Coll. Ex.
POTTER, C. NATHAN, 120 Brook St., East Holliston. RHOP. esp. *Colias, Boloria.* Coll. Ex. Buy. Rear.
Reinthal, Walfried J. (Dr.), Northampton State Hospital, Northampton. RHOP: Nearctic (esp. *Asterocampa*) and Palearctic. Coll. Ex. Buy. Sell. Rear.
Scott, Arthur H., 20 Bishop Pky., Pittsfield. Life History. Coll. Ex. Buy.
Shappirio, David G., Biological Laboratories, Harvard University, Cambridge 38. LEPID. Physiology. Ex. Buy. Rear. Living Material.
*Smith, Marion E. (Dr.), Fernald Hall, University of Massachusetts, Amherst. MACRO. esp. Arctiidæ. Life History. Univ. Coll. Rear.
Walcott, Charles, 81 Sparks St., Cambridge 38. MACRO: esp. Saturniidæ. Photography, Sex Attractants in Moths. Buy. Sell. Rear.
Williams, Carroll M. (Prof.), Biological Labs., Harvard University, Cambridge 38. RHOP. MACRO: esp. Saturniidæ. Physiology of metamorphosis. Coll. Buy.

MICHIGAN

Crampton, Charlene E. (Miss), Rt. #1, White Pigeon. Coll. Ex. Buy.
*DREISBACH, ROBERT R., 301 Helen St., Midland. LEPID. of Michigan. Coll.
Goyer, Robert W., P.O. Box 95, Bellaire. RHOP: esp. Papilionidæ, Lycænidæ. MACRO. Coll. Ex. Buy.
HODGES, RONALD W., 1123 Theodore St., Lansing 15. RHOP. esp. Lycænidæ, Hesperiidæ. MACRO. Coll. Rear.
*McALPINE, WILBUR S., 2501 Bogie Lake Road, Route 5, Milford. RHOP: esp. Riodinidæ. MACRO: local. Coll. Ex. Buy. Rear.
Machwart, Robert J., 335 Walnut St., Rochester. RHOP: MACRO: esp. Sphingidæ, Noctuidæ. Coll. Ex. Buy. Rear.
*Newman, John H., 9821 Peer Road, R.F.D. #1, South Lyon. LEPID: of Michigan. Coll. Ex. Rear.
*NIELSEN, MOGENS C., 1105 North Chestnut, Lansing 6. RHOP. MACRO: esp. Sphingidæ, Saturniidæ, Noctuidæ. Coll. Ex.
Perkins, Owen A., 1605 Crooks Rd., Royal Oak. LEPID: esp of Michigan. Coll.
*VOSS, EDWARD G. (Dr.), 1015 Lincoln Ave., Ann Arbor. LEPID. of northern Michigan. Hesperiidæ of world, esp. Classification and Phylogeny. Coll. Ex.
~~GALLEY 3 LEPID~~.
Wagner, Warren H., Jr. (Dr.), 721 Mt. Pleasant Ave., Ann Arbor. RHOP: esp. Hesperiidæ, Lycænidæ. MACRO. Coll. Rear.
Wilson, Bruce V., 815 N. Chipman St., Owosso.

MINNESOTA

COX, SAM M., 2624 Minnesota Avenue, Duluth 11. Larvæ of MACRO. and MICRO. Coll. Ex. Rear.
Tveten, John L., Kiester. RHOP. Coll. Ex. Buy.
Wilkie, R.J., c/o Continental Machines, Inc., Savage. RHOP. MACRO. Coll. Buy.

MISSISSIPPI

Jones, Jack R., Jr., 304 Robinhood Road, Jackson. MACRO: Sphingidæ, Saturniidæ, *Catocala.*
*MATHER, BRYANT, P.O. Drawer 2131, Jackson. RHOP. Coll. Ex. Buy. Sell.

MISSOURI

Bright, Robert R., Route 2, Box 77, St. Charles. LEPID. Coll. Ex. Buy.
Heitzman, John R., 3112 Harris Ave., Independence.
Johnson, Dale, 724 Grand, Kansas City 6.
Littahorsky, Anton, 3808 Union Rd., St. Louis 23. RHOP. MACRO. Coll. Ex.
*MEINERS, EDWIN P. (Dr.), 6651 Enright Ave., St. Louis 5. RHOP. MACRO. Coll. Buy.
*Pickel, B.H., 3619 Gordon Ave., Overland 21. RHOP: esp. Theclinæ. Migration. Coll. Ex.
*REMINGTON, P. SHELDON, 5570 Etzel Ave., St. Louis 12. RHOP: esp. *Megathymus, Hesperia,* Lycænidæ, *Œneis, Erebia.* MACRO: esp. Sphingidæ, Saturniidæ, *Catocala.* Coll. Ex. Buy.
*Thomas, George W., 106 Whitten Hall, Dept. of Entomology, University of Missouri, Columbia. MACRO: esp. Noctuidæ (Plusiinæ). Coll. Ex.

NEBRASKA

FROEMEL, E.A., Columbus. RHOP. MACRO: esp. *Catocala.* Coll. Ex.
Johnston, David W., Box 377, Broken Bow. RHOP. MACRO. Coll.

NEVADA

Dickinson, Krestine M., Box 435, LEPID. Coll. Ex. Rear.

NEW HAMPSHIRE

*Gerould, John H. (Prof.), 36 Occum Ridge, Hanover. RHOP: Pieridæ, esp. *Colias.* MACRO: esp. *Bombyx.* Genetics, ecology of *Colias.* Anatomy and circulation of *Bombyx.* Mimicry.
*Lennox, Donald J., R.F.D. #1, Whitefield. RHOP. MACRO. Life History. Coll. Ex.
RITTERBUSH, PHILIP C., 20 Lafayette St., Laconia. RHOP. Coll. Ex. Buy. Rear.
SMITH, RICHARD S., 83 Shore Drive, Laconia. RHOP. Coll. Ex. Buy. Sell.

NEW JERSEY

BOONE, PETER, Greenhouse Drive, Princeton. MACRO: esp. Sphingidæ, Ceratocampidæ. Buy. Sell. Rear.
Bowe, John J. (Dr.), 1017 Woodland Ave., Oradell. RHOP. MACRO. Coll. Ex. Rear.
*BUCHHOLZ, OTTO, 493 Markthaler Place, Roselle Park. RHOP. MACRO. Coll. Ex. Buy. Rear.
CADBURY, JOHN W., III, Spung Hollow, R.D. #1, Pemberton. MACRO: esp. Noctunidæ, Notodontidæ, Sphingidæ. Coll. Ex. Buy. Sell.
Comstock, W.P., R.F.D. 2, Box E, Shark River Hills, Neptune.
*DOS PASSOS, CYRIL F., Washington Corners, Mendham. RHOP. esp. Satyridæ Coll. Buy.
Ebner, James A., Birds Trailer Park, Wrightstown. RHOP. Coll. Ex.
Fleming, Henry, Box 84, Coytesville.
Garthe, William A., Hanover Road, Hanover. RHOP. MACRO. Coll. Ex. Buy. Rear.
MULLER, JOSEPH, R.D. 1, Lebanon. LEPID. of New Jersey only. Life History. Coll.
OSBORNE, MELVILLE W., 2100 Price Street, Rahway. RHOP. MACRO. Coll. Sell. Rear.
*RAWSON, GEORGE W. (Dr.), c/o Ciba Pharmaceutical Products, Inc., Summit. RHOP. MACRO. Coll. Ex.
Small, Gordon B., Jr., 100 Oxford St., Glen Ridge. RHOP: esp. Lycænidæ. MACRO. Coll.
Treat, Asher E., 51 Colonial Parkway, Dumont. MACRO Tympanic organs. MICRO.
Ziegler, J. Benjamin (Dr.), 64 Canoe Brook Parkway, Summit. RHOP: Lycænidæ (esp. Theclinæ). Coll. Ex. Buy.

NEW MEXICO

EYER, JOHN R. (Dr.), Box 66, State College. MICRO: esp. Lyonetiidæ, Opostegidæ, Nepticulidæ. ♂ and ♀ Genitalia.
Nymeyer, Robert, 116 S. Canal St., Carlsbad. RHOP. Coll.

NEW YORK

*BELL, ERNEST L., 150-17 Roosevelt Ave., Flushing 54. RHOP: esp. Hesperiidæ.
BUXBAUM, Paul, 360 Central Park West, New York 25. RHOP: esp. Papilionidæ. Coll.

COLLINS, VICTOR C., 255 West 84th St., New York 24. RHOP: esp. of South America and Indo-Pacific. Coll. Ex. Buy.
DOYLE, L.F. BOKER, Duck Pond Rd., Glen Cove, Long Island.
Duane, John P., 33 Grandview Circle, Manhasset.
Farquhar, Donald W. (Dr.), 185 Claremont Ave., New York 27. LEPID. Food Plants, Distribution, Life History, etc. Coll. Ex.
*FRANCLEMONT, JOHN G. (Dr.), Dept. of Entomology, Cornell University, Ithaca. MACRO: esp. Noctuidæ, Notodontidæ, Lymantriidæ. Coll. Ex. Buy. Rear.
*FREDERICK, ALBERT C., 6 Matilda St., Albany 9. RHOP: esp. Lycænidæ. Coll. Ex.
Gertsch, Willis J. (Dr.), American Museum of Natural History, New York 24. Nearctic RHOP., esp. Lycænidæ. Coll. Ex.
Gillham, Nicholas W., No.4 Washington Square North, New York. RHOP: esp. Lycænidæ, *Melitæa, Euphydryas,* Hesperiidæ. Coll. Ex. Buy. Sell.
Goliger, Melvin J., 369 Alabama Avenue, Brooklyn 7. RHOP. MACRO. Coll. Ex. Buy. Sell. Rear.
*HEINEMAN, BERNARD, 175 West 72nd St., New York 23. RHOP: of Jamaica. MACRO: esp. *Catocala.* Coll.
Hellman, Geoffrey T., 228 E. 61st St., New York 21.
HOPF, ALICE LIGHTNER (Mrs.), 136 West 16th St., New York 11. Migration. Coll.
Iveson, Robert J., Jr., 12 High St., Brockport. RHOP: esp. Papilionidæ MACRO. (*Troides*). Coll. Ex. Buy. Rear.
*Keji, Joseph A., Biggs Hospital, Ithaca. RHOP. MACRO. Traps, Photography. Ex. (pupæ). Rear.
*Klots, Alexander B. (Prof.), American Museum of Natural History, New York 24. RHOP: esp. *Boloria, Colias.* MICRO: esp. Crambinæ. Coll. Ex. Buy. Rear.
Kolyer, John M., 104 Renison Drive, Westbury. RHOP: esp. Papilionidæ. MACRO.
Latham, Roy, Orient, Long Island. LEPID. Coll. Rear.
Marks, Louis S. (Dr.), Biological Lab., Fordham University, New York. RHOP: esp. *Papilio.* Coll.
Miller, Howard C. (Dr.), 222 N. Collingwood Ave., Syracuse 6. RHOP: esp. tropical Pieridæ, Nymphalidæ. MACRO. Coll. Buy. Rear.
Morris, John W., 2704 W. Genesee St., Syracuse 4. RHOP: esp. Papilionidæ. MACRO: esp. Sphingidæ. Coll. Ex. Buy. Rear.
*Nabokov, Vladimir (Prof.), Goldwin-Smith Hall, Cornell University, Ithaca. RHOP: esp. Holarctic Lycænidæ.
OBRAZTSOV, NICHOLAS S. (Dr.), 11 Cromwell Place, Sea Cliff, Long Island. LEPID: esp. Palearctic Ctenuchidæ, Holarctic Tortricoidea. Morphology of Genitalia.
Pirone, Dominick J., 108 No. Columbus Ave., Mt. Vernon. RHOP. MACRO. Coll. Ex. Buy.
Richter, Max L., Butterfly Farm, East Durham. RHOP. MACRO. Coll. Ex. Buy. Sell. Rear.
Riley, Thomas J., Box 6, Brandywine Station, Schenectady 4. RHOP. MACRO. Coll. Buy.
*Rindge, Frederick H. (Dr.), American Museum of Natural History, New York 24. MACRO: esp. Geometridæ. Life History. Coll. Ex. Buy. Sell.
Roberts, M. Anthony, 3 Blackstone Place, Riverdale 71. RHOP. MACRO. Life History. Coll. Buy. Rear.
*Rupert, Laurence R., Sardinia. MACRO: Geometridæ esp. Ennominæ. Life History. Coll. Ex. Rear.
Sanford, Leonard J., 210 E. 69th St., New York 21. RHOP. of East Indies and New Guinea, esp Pieridæ. Ex.
*SHOUMATOFF, NICHOLAS, Box 333, Bedford. LEPID: of eastern U.S.A. and West Indies. Distribution, Morphology. Coll. Ex.
Shulgin, Michael, 3324 Perry Ave., Bronx. RHOP. MACRO, esp. Geometridæ. Coll. Ex.
*SPELMAN, M., 2277 Andrews Avenue, Bronx 68. RHOP. esp. Pieridæ. MACRO. Coll. Ex. Buy. Sell.
Thunelius, Robert E., 90-13 168th St., Jamaica 32. RHOP. esp. *Papilio,* Nymphalidæ. Coll. Ex. Buy. Rear.
Wheaton, William L. (A/2C), Box 812, 3650 USAF Hospital, Sampson AFB. RHOP. esp. Rocky Mts. Coll.
*Whittaker, Robert H. (Dr.), Biology Dept., Brooklyn College, Brooklyn 10. Ecology.
Wilcox, LeRoy, Speonk, Long Island. LEPID. Coll. Ex.
*Zappalorti, Michael, 123 Androvette St., Staten Island 9. RHOP. Coll. Ex. Buy. Rear.

NORTH CAROLINA

BUTLER, ROBERT, Box 1057, Southern Pines. RHOP: of world; esp. Papilionidæ, Nymphalidæ, Pieridæ. MACRO: Saturniidæ. Coll. Ex. Buy.

Covell, Charles V., Jr., Box 569, Southern Pines. RHOP. MACRO. Coll. Ex.

Eaton, Theodore H., Jr., East Carolina College, Greenville. RHOP. MACRO. Coll. Ex. Buy. Sell.

*GOTTSCHALK, CARL W. (Dr.), 1300 Mason Farm Road, Chapel Hill. RHOP: esp. of Arctic. Pigment Metabolism. Coll. Ex. Buy. Sell.

Jamison, J. R., Jr., 12 Thomson Ave., Canton. RHOP. esp. Papilionidæ, Heliconiidæ. Coll. Ex. Buy. Sell.

KNUDSEN, JOHN P., 120 South Boundary St., Chapel Hill. RHOP. esp. Papilionidæ. MACRO. esp. Saturniidæ. Hybridization. Coll. Ex. Rear.

*McELVARE, ROWLAND R., Southern Pines. MACRO: esp. Heliothiinæ. Coll. Ex. Buy. Rear.

NORTH DAKOTA

Adler, Julius, 407 Oak Street, Grand Forks. RHOP. Coll. Ex.

OBERFOELL, JIM, Buffalo Springs. RHOP. MACRO. esp *Catocala.* Coll. Ex.

OHIO

*BAKER, CLEMENT W., P.O. Box 455, Waynesburg. RHOP. MACRO. Coll. Buy.

*BRAUN, ANNETTE (Dr.), 5956 Salem Road, Mt. Washington, Cincinnati 30. MICRO: esp. *Bucculatrix* Coll. Ex. Rear.

Cobb, Robert B., 1109 Asbury Rd., Cincinnati 30. RHOP. MACRO. Coll. Ex. Sell.

*Ferguson, Elias A., 1213 Bellflower Ave. S.W., Canton 10. RHOP: esp. *Papilio.* MACRO: esp. *Catocala.* MICRO. Coll. Ex. Buy. Sell.

*Lauck, Albert G., 5142 Harvest Lane, Toledo 13. RHOP. Coll.

Miller, Dale D., 5795 Mill Creek Blvd., Boardman. RHOP. esp. Nymphalidæ. Coll. Ex.

*Smalley, Stephen B., 6129 Glade Ave., Cincinnati 30. RHOP. MACRO. Life History Photography. Coll. Ex. Buy. Rear.

Taylor, Herbert S., 1369 Fair Ave., Columbus 5. RHOP. MACRO. Coll. Buy.

Thomas, Edward S., Ohio State Museum, Columbus 10. RHOP: esp. Hesperioidea, Hair-streaks. MACRO: esp. *Catocala.* Life History, Distribution. Coll.

Thrasher, William, R.D. Route 2, Garrettsville. RHOP. and MACRO. of world, esp. Papilionidæ and Saturniidæ. Coll. Ex. Buy. Sell.

Wren, George R., 437 30th St., N.W., Canton 9. RHOP: esp. Satyridæ. Coll.

OREGON

*Albright, Ray, Route 1, Box 277, Dayton. RHOP. Coll. Ex.

*Baker, James H., 2800 Broadway Baker. LEPID. Coll. Ex.

Jewett, Stanley G., Jr., 7742 S.E. 27th Ave., Portland 2. RHOP. esp. *Euphydryas.* Coll. Ex.

Macy, Ralph W. (Prof.), Reed College, Portland 2. RHOP. MACRO. Coll. Ex. Buy. Rear.

Scott, Leonard M., 6537 S.E. 83rd St., Portland 66. RHOP. esp. Papilionidæ, Heliconiidæ. MACRO. esp. Noctuidæ. Coll. Ex. Buy. Sell. Rear.

PENNSYLVANIA

*ACKERMANN, OTTO, 639 Walnut St., Irwin. RHOP. MACRO. Coll. Sell (Plastic mounts).

*Adams, Joseph W., 32 Pleasant St., Philadelphia 19. RHOP. Coll. Ex.

Anderson, Richard A., 411 Summit Drive, Pittsburgh 34. RHOP. MACRO. Coll. Ex.

*CARY, MARGARET M. (Mrs.), Ellet Lane and Wissahickon Ave., Mt. Airy, Philadelphia 19. MACRO: esp. Sphingidæ. Coll. Ex. Buy. Rear.

*Clench, Harry K., Section of Insects and Spiders, Carnegie Museum, Pittsburgh 13. RHOP: Lycænidæ, esp. Theclinæ. MACRO. Coll. Ex. Buy.

Dixon, Bruce W., 119 Cherry Valley Road, Pittsburgh 21. RHOP: esp. Hesperioidea. MACRO. Coll. Ex. Buy. Rear.

EHLE, GEORGE, 314 Atkins Ave., Lancaster. RHOP. Coll. Rear.

*Jay, William, 6358 McCallumn St., Germantown, Philadelphia. RHOP. esp. *Papilio.* Buy.

Kopp, Larry J., R.D., Klingerstown. LEPID. Coll. Sell. Rear.

Malcolm, John A., Jr., 1590 Williamsburg Road, Pittsburgh 16. RHOP: esp. Pierinæ. MACRO. Coll. Ex. Sell. Rear.
†MELLON, E.P. II, 441 Maple Ave., Pittsburgh 18. LEPID. Coll. Ex. Buy. Sell.
Mergott, Winston B., 549 Oxford Blvd., Pittsburgh 16. RHOP. MACRO. Coll. Ex. Rear.
*MERKER, C.G., 1520 Cooper St., N.S., Pittsburgh 12. LEPID. Coll. Ex. Buy. Sell.
*Moyer, Howard C., Box 240, R.D. 2, Sinking Spring. RHOP. MACRO. Coll. Ex. Buy. Sell.
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*NAPIER, ARTHUR H., 503 East Willow Grove Ave., Chestnut Hill, Philadelphia 18. Nearctic RHOP. MACRO: esp. Sphingidæ, *Catocala.* Coll. Ex.
*Peters, George, Adamstown. RHOP. MACRO. Coll. Ex. Buy. Sell.
PRESTON, FLOYD W., 526 Linden Rd., State College. RHOP: esp. Pieridæ. Coll. Ex.
PRESTON, JUNE D. (Mrs.), 526 Linden Road, State College. RHOP: esp. Lycænidæ. Coll. Ex.
Rupprecht, Jerome (Rev.), St. Vincent Archabby, Latrobe. RHOP. MACRO. Coll. Ex.
STAFFORD, CHARLES W., 1125 Tennessee Ave., Pittsburgh 16. RHOP. MACRO. Coll. Ex. Sell. Rear.
*TIETZ, HARRISON M. (Prof.), Dept. of Zoology, Pennsylvania State University, State College. RHOP. MACRO: esp. Noctuidæ. Life History. Coll. Ex. Buy.

RHODE ISLAND

DANE, BENJAMIN, Indian Ave., Middletown. MACRO: Saturniidæ, esp. Life History Photographs and Sexual Attraction. Coll. Ex. Buy.
French, Ellery W., 247 Washington Ave., Providence 5. RHOP. MACRO.
Sheldrick, Peter, Box 1710, Brown University, Providence 12. RHOP. esp. Lycænidæ, Nymphalidæ. MACRO. esp. Saturniidæ. Coll. Rear.

SOUTH DAKOTA

Harvey, W.B., Box 52, Wall. RHOP. MACRO. Coll. Ex. Buy. Sell.

TENNESSEE

Roever, Kilian, R.F.D. #2, Jackson. RHOP. esp. Hesperioidea, Theclinæ. Coll. Ex. Buy. Sell.
Webster, Clarence G., 1500 Ridley Blvd., Nashville 4. LEPID. Coll. Buy.
WILCOX, WILLIAM J., 213 Alhamgra Rd., Oak Ridge. RHOP.

TEXAS

ANDERSON, C.A., 3209 Centenary, Dallas 25. RHOP: esp. *Danaus Plexippus.* Migration. Rear.
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*Glick, Perry A., P.O. Box 1033, Brownsville. RHOP: esp. Papilionidæ. MACRO: esp. *Catocala,* Saturniidæ. Aerial Insect Dissemination and Migration, Cotton Insects. Coll. Ex. Buy.
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*Orchard, C.D., Grayson St. Station, P.O. Box 242, San Antonio. LEPID. Coll.
Plass, Harold J., Jr. (Dr.), 4518 Highland Terrace, Austin. RHOP. Coll. Ex. Buy.
*STRUCK, B., P.O. Drawer 271, Brownsville. RHOP.

UTAH

DENNIS, ARTHUR E., 758 N. 4 E., Provo. RHOP. Life History. Coll. Ex.
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†PHILLIPS, W. LEVI, 985 S. Third East Street, Salt Lake City 4. MACRO: esp. *Pseudohazis.* Ex. Buy.

VIRGINIA

Blevins, T.B. (Dr.), 3513-A So. Stafford St., Arlington 6. RHOP. esp. Nymphalidæ. MACRO. Coll.

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†Life Member

EPSTEIN, HANS J., 1110 Prince St., Alexandria. RHOP: esp. Papilionidæ. Coll. Ex. Buy.

*NICOLAY, STANLEY S. (Lt. Col.), Qrts. R-5, Marine Corps Schools, Quantico. RHOP.: esp. Lycænidæ, Hesperiidæ. Coll. Ex. Buy.

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WASHINGTON

*Anderson, Andrew, P.O. Box 192, Pateros. MACRO. Coll. Ex.

*BAUER, DAVID L., 1103 Ballew Ave., Everett. RHOP.: esp. *Melitæa* and *Chlosyne* of world; U.S. *Papilio machaon* group. Coll. Ex. Buy. Sell. Rear.

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*COOK, WILLIAM C. (Dr.), 219 Newell St., Walla Walla. MACRO: esp. Noctuidæ. Ecology, Distribution. Coll. Ex.

*Frechin, Donald P., Route 5, Box 838, Bremerton. RHOP: esp. *Euphydryas, Mitoura.* MACRO: esp. Washington diurnals. Coll. Ex. Buy. Sell. Rear.

*Hopfinger, John C., Brewster. RHOP: esp. Satyridæ, Lycænidæ. MACRO: esp. Saturniidæ. Coll. Ex. Buy. Sell.

Jennings, Dean, Sittner Hall, Walla Walla College, College Place. RHOP. esp. Papilionidæ. Coll. Ex. Sell.

PEARSON, JAMES C., 5441 Windemere Rd., Seattle 5. RHOP. Coll. Ex.

WISCONSIN

*ARNHOLD, F.R., Route 3, Chippewa Falls. RHOP. MACRO. esp. *Catocala.* Coll. Ex. Buy. Rear.

Bower, H.M., 601 McIndoe St., Wausau. RHOP. MACRO. Coll. Ex. Buy. Rear.

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Schirmer, George F., 2912 N. 45th St., Milwaukee 10. RHOP: esp. Papilionidæ, Pieridæ, Nymphalidæ, Morphidæ, Brassolidæ. Coll. Ex. Buy. Sell.

*SIEKER, WILLIAM E., 119 Monona Ave., Madison 3. RHOP. MACRO: esp. Sphingidæ, Saturniidæ, Citheroniidæ, *Catocala.* Coll. Ex. Buy. Sell. Rear.

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*ZIEMER, Sylvester E., 715 Dorelle St., Kewaunee. LEPID. Coll. Ex. Buy. Sell. Rear.

WYOMING

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Membership in the Society is open to all persons interested in any aspect of lepidopterology. All members in good standing receive *The Lepidopterists' News.* Institutions may subscribe to the publications but may not become members. Prospective members should send to the Treasurer the full dues for the current year, together with their full name, address, and special lepidopterological interests. **All other correspondence concerning membership and general Society business should be addressed to the Secretary.** Remittances in dollars should be made payable to: *The Lepidopterists' Society.* There are three paying classes of membership:

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Each year a list of members of the Society is published in the *News,* with addresses and special interests.

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